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THE PATHOGENIC COLON

RECENT STUDIES*

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THE average human colon is clearly a compromise. It is a composite structure, part carnivore, part herbivore. Any student of the colon who is not mindful of its developmental vagaries as manifested in variations of form and function is ill-equipped to differentiate between the pathogenic and non-pathogenic colon.

The term, pathogenic colon, requires definition. It is a colon disorganized in such manner as to cause disease in other parts of the body. It is non-malignant, non-specific, never acute. Its pathogenesis is basically dependent upon chronic bacterial parasitism for which the fundamental predisposing cause is congenital dysmorphism, and the contributing cause gravitation.

Developmental anomalies have been noted by many writers. Few have done more than comment upon them as being interesting variations from an established order, without seriously questioning their derivation or possible pathogenesis. For the purposes of modern study no successful effort has been made looking to their correlation with established laws. They have long been regarded as isolated dissecting-room curiosities, no well-defined effort having been made to interpret them either at the operating table or at necropsy. Thus to correlate and interpret them and to present further evidence pointing to the dominant part played by heredity in transmitting them is the principal purpose of this protocol.

EMBRYOLOGY

During the fifth and sixth weeks of embryonic life the dorsal wall of the then spindle-shaped stomach begins to distend, owing to rapid growth. The ventral wall, on the contrary, undergoes no change, with the result that the stomach now assumes a dorsal convexity which is later to become the greater curvature. Prior to the beginning of this development, usually at the end of the fourth week, the alimentary canal caudad to the stomach had consisted of a straight and undifferentiated tube. While these changes in the stomach are taking place this tube is also growing in length and is becoming folded. Aborad to the pylorus, which is still directed caudad, the tube turns dorsad for a short distance close to the vertebral column, where it again turns and proceeds caudoventrad to describe a large loop consisting of two nearly parallel arms. The caudoventral convexity of this loop is the site of attachment of the vitelline duct, which sometimes persists as Meckel's

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diverticulum, and is the arbitrary mark between the primitive fore and hindguts. The dorsal arm of this loop, or hindgut, runs dorsocephalad, to bend caudad again near the vertebral column. The ventral arm, or foregut, together with a small portion of the dorsal arm, or hindgut, is to become the adult small intestine, but before this occurs it will undergo enormous increase in length. The remainder of the dorsal arm is to become the colon and together with the stomach and duodenum will undergo relatively little change. The fact that the beginning and the end of the alimentary canal arise from primitive structures which have their counterpart in practically all vertebrate embryos throws light upon the important physiological relationship between the adult structures referred to later.

During the fourth month the rotation of the stomach which had begun several weeks before is nearly completed. The cause of this rotation is not understood, but it serves to carry the terminal ileum and the rudimentary cecum near to the liver in what has been designated the "second position." Meanwhile, the transverse colon has elongated. Growth impulse is usually arrested as soon as rotation has taken place. This explains the occasional finding of the cecum and appendix in the upper right quadrant, and the difficulty in differentiating infantile appendicitis from pulmonary lesions. During this resting period it is not uncommon for membranes from the mesogastrium to become attached to the primitive cecum, the mesogastrium being in some cases extended to the right, to find insertion upon the liver, gall bladder and duodenum as well as upon the colon, cecum and terminal ileum. This accounts for the finding in adult life of the so-called hepato-duodeno-colic ligaments of various forms. When growth is resumed, a process sometimes delayed until extrauterine life, and the migration of the cecum caudad leads to the development of the so-called ascending colon, these mesogastric placements are dragged down as fan-like distributions of the omentum, often extending over the entire right portion of the large bowel. While it is relatively easy after a careful review of the embryological development so far outlined to explain the occurrence of certain right-sided pressure membranes, it has been much more difficult for the writers to understand their appearance upon the left side. The occurrence and frequency of their bilateral symmetry is also enigmatic. These questions have been considered in previous studies.[1,2,3]

CONSIDERATION OF AGE AND MORPHOLOGICAL VARIATIONS

The typical characteristic of the childhood colon is *uniformity* of appearance, just as other physical characteristics of children tend to uniformity. Moreover, the colon of the child is usually free from the minor variations found in later life, such as those resulting from ordinary or accidental wear and tear. Congenital variations, therefore, stand out sharply and unmistakably, it being usually unnecessary to differentiate them from acquired changes. The colon of the infant and child grows rapidly. Its physiological activities are accentuated. Its stability and final form are yet to be attained.

The typical characteristic of the adult colon is *diversity*. The fact that it must conform to the habitus entails upon it a wide range of morphological variation. The colon of the meso-ontomorph, often referred to as the hypersthenic, lies high in the abdomen under a wide costal arch. It is relatively short and the cecum is frequently found near the second position. The colon of the hyperontomorph, sometimes called hyposthenic, hangs low in the abdomen between a narrow costal arch and is relatively long in all of its components. Between these two types are found numerous gradations, any one of which may be considered as morphologically typical for a given individual, but when so considered it must also be proven to be functionally normal as related to that individual.

The typical characteristic of the colon of old age is also morphological diversity, plus a frequent almost habitual tendency to structural *degeneration*. Wear and tear has done its work. In old age the percentage of acquired abnormalities is relatively high and of congenital abnormalities relatively low. In childhood the reverse is true. The reason for this is not difficult to understand. Congenital colon dysmorphism shortens life.

Correlating our observations upon these typical colons of three salient age periods, the conclusions of Bryant[4] with regard to the normal incidence of visceral adhesions and bands are pertinent. He states:

1. The frequency of occurrence of adhesions or bands in the fetus of both sexes has been greatly underestimated. Of a group of 34 fetal cases of both sexes only 5.9 per cent were free from demonstrable adhesions or bands; 100 per cent of the 18 male feti showed such variations from the normal.

2. The adhesions present in the fetus are less varied in number and of a definitely less complex type than those found to occur in later life.

3. The age of forty is critical in both sexes. There is practically no increase in frequency above the fetal rate of involvement for the different viscera by adhesions until the age of forty. Beyond the age of forty there is a sudden increase of about 50 per cent in the involvement of the different viscera by adhesions in both sexes, the increase being somewhat more marked in the female than in the male.

PHYSIOLOGY

Water absorption in the stomach and small gut is negligible. The colon alone fulfills this function. Perhaps the earliest observation to this effect was made by the late Baron Munchausen. He is known to have remarked the astounding fact that his horse was able to drink water indefinitely after dashing under the falling portcullis. Immediately upon noting this physiological riddle he discovered that the answer was the accidental removal by the portcullis of the rear half of his horse, including of course the colon. This is the first recorded instance of colectomy. In many other respects the analogy between the stomach and the colon, the beginning and the end of the alimentary canal, is striking. The common function of the two is storage plus churning. In the stomach this serves to blend water with the ingesta, in the colon to remove it. Neither the stomach nor the colon aids materially in digestion. The digestive function of the stomach can be dispensed with as readily as the water-absorbing function of the colon. These statements are at variance with generally accepted teaching, but they are easily verified in human beings or other vertebrates by the surgical removal of either organ.

The whole question of colon motility is still *sub judice*. We have observed hundreds of colons fluoroscopically without ever having seen mass motion in any but an irritable colon, and then but rarely. We do not deny that mass motion in a non-irritable colon may occur and probably does occur as a daily phenomenon associated with the normal defecatory impulse. Many observers have so reported. The theory of mass motion fails to explain to our satisfaction the equal distribution of barium found with such great frequency in functionally normal colons during routine serial examination. The frequent finding of a solid column of barium from the cecum to the splenic flexure twenty-four hours after the ingested meal does not in all respects support the theory of mass motion as the only prostaltic motor activity of the colon. Our observations of the apparent autonomic muscular activities of the excised colon confirm to some degree at least a theory of slow and imperceptible colonic movements based largely if not wholly upon segmental systoles and diastoles. The recently excised human colon, when thoroughly chilled and brought back to room temperature, has been observed to extrude its contents by an almost imperceptibly slow segmental contraction. Propulsion of the effluent is an important but

little understood function of the colon. It is the dominant function of the heart and the propulsive mechanism is there understood. The heart is a highly specialized systo-diastolic muscular pump, equipped with intricate valves. The colon is a poorly specialized systo-diastolic pump, equipped with primitive valvular folds and in some of the lower vertebrates, notably the dogfish, with the more specialized spiral valves. The heart musculature is autonomic and subject to reflex control. The same is true of the colon. In the heart, force, frequency and rhythm are dominant. In the colon these are underdeveloped and obscure. Motility of the effluent through the heart is rapid, through the colon very slow. Perhaps too much stress has been laid upon the reflex neuromuscular mechanism as being the sole initiator of motor function throughout the alimentary canal. The investigations of Alvarez[5] have thrown much light on the autonomic management of intestinal motility. Mass motion in the colon, associated occasionally as it is with the stimulation of food passing into the stomach, is in large part if not wholly a reflex phenomenon. Motor transport through the colon impresses us as analogous to the horse-drawn transport of garbage through the main thoroughfare of a large city, the horse supplying the autonomic arrangement, the cart the physical vehicle, and the driver, tripping the release of the dump cart at the journey's end, the neuromuscular reflex. Without the horse the driver's efforts would be fruitless if not disastrous.

FIG. 2. CASE NO. 3940. Typical bilateral omental deviation with involvement of splenic flexure. Constriction, rotation, pressure and degeneration. Profound neurasthenia and drug addiction. (See Figs. 1 and 3.)

FIG. 3. CASE NO. 6051. Son of 3940 (Figs. 1 and 2). Megacecum. Petit mal.

SYMPTOMATIC ASPECTS OF THE PROTECTIVE MECHANISM

In the colon as in all other organs the occurrence of painful or disabling symptoms is almost always traceable to the protective reaction of the organism. Pain signifies spasm rather than dilatation. If pain is present with dilatation our clinical and roentgenological observations indicate

that spasm is also present though not always demonstrable. Sensory pain-endings are present in the parietal peritoneum but not in the visceral. Pressure sensory endings are probably present in the intestinal musculature just as they are in the voluntary musculature, and in both cases register pain as a result of spasm. But in the case of involuntary intestinal musculature, the pain which is misreferred or reflected to certain cutaneous areas obscures the proper evaluation of the deep-seated pain actually present in the viscera affected. The presence of this can hardly be questioned. Spasm and pain are physiological reactions to a pathological condition.

Fig. 4. Case No. 6143. Obstructive right and left omental deviants. Colon damaged and pathogenic. Depression. Colectomy; recovered.

Alterations in motility, too frequently considered as pathological entities, are in reality physiological reactions to pathological states and are protective in their very nature. Diarrhea needs no comment. Protective constipation is less easily understood. Excluding the type of constipation which appears to have a purely mechanical origin, there remains a much more important and more frequently encountered type the origin of which can not be so easily explained. It is basically protective in character. It may be segmental or total in its distribution and in the main is the response to a physiological demand for rest. The mechanism of its production is neuromuscular. The paralytic ileus of acute peritonitis is protective. The atonia of chronic peritonitis is in the highest sense protective.

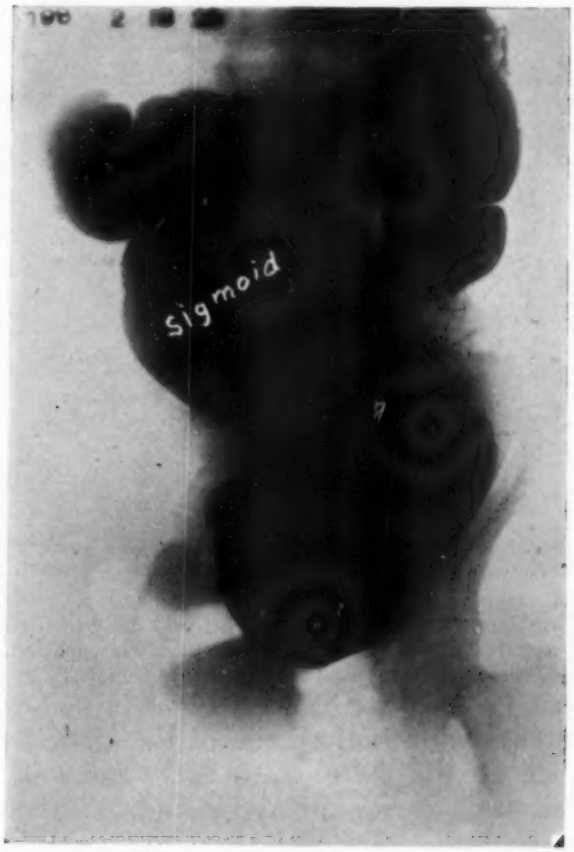

Fig. 5. Case No. 6273. Sister of 6143 and aunt of 6614. Megasigmoid with evidence of bilateral omental deviants. Early psychosis.

True mucous colitis has little pathogenic significance. The organized production of water-insoluble mucus by the colon is a highly protective response to certain types of infection and serves to inhibit pathogenesis even in the presence of severe and unalterable damage to the colon.

The neuromuscular relationship between the sphincters of the alimentary canal,

particularly the pyloric and ileocecal, is just as definite as it is delicate. Disturbance in intersphincteric balance is prone to follow pathological disturbances in the colon. Many stomachs are exhaustively and uselessly studied because of the frequently encountered syndrome of anorexia, nausea, vomiting, heartburn and gastric

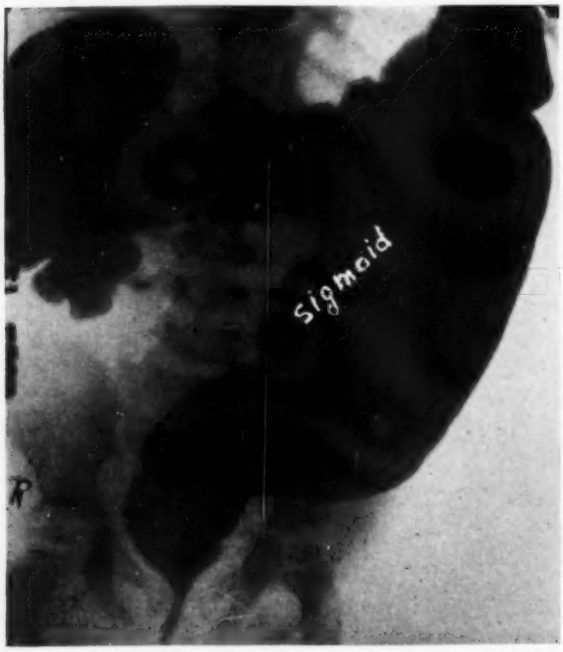

Fig. 6. Case No. 6614. Megasigmoid and probable right omental deviant in five-year-old niece of 6143 and 6273. Weight 35 lbs. Persistent constipation. Dwarfism. Note position of cecum.

retention. It is the hope of the clinician that he will be enabled to account for this train of symptoms by finding either a gastric or duodenal ulcer, cholecystitis or chronic appendicitis; in other words, something intrinsic in the stomach or in its immediate vicinity. Failing in this, is he justified in assuming that he is dealing with symptoms arising from a more or less vague and hopeless vagotonia or neurasthenia, or is it possible that he is confronted with a physiological condition of somewhat remote origin, and one that is fundamentally protective? It is a far cry from the anal sphincter to the sphincter of the cardia, but cardiospasm and pylorospasm have been known to rest on so simple a foundation as anal fissure. If this be so, how much greater must be the influence of that enigma, the colon, the intimate relationship of which to intra-abdominal disorders is just beginning to be understood. Many a diagnostic error has resulted from failure to recognize the fundamental integrity of the alimentary canal.

Fig. 7. Case No. 5627. Long-standing colitis with fibrosis in female aged seventy. Not a pathogenic colon. Note right-sided dilatation and left-sided contracture.

PATHOLOGICAL ANATOMY

In discussing malformations in any part of the body it is necessary to know whether they are congenital in origin or whether they have been acquired after birth. In considering the human colon this distinction is difficult, particularly in the later years of life. In the first part of this paper we reviewed in some detail the occasional anomalous development of the omentum and referred to Bryant's classification and conclusions. We recited the mechanism by which the embryologically atypical omentum produces its deforming and damaging pressure upon the colon. There

is need for much further study of this subject. Hereditary transmission of gross anatomical defects in the colon, such as megacolon, megacecum and megasigmoid, is demonstrable by means of roentgen-ray studies of families. If, as we believe frequently happens, omental defects coexist with congenital colon anomalies, irregular and destructive pressure ensues and thus a fertile field is opened to any form of bacterial invasion. Such a colon may easily become a pathogenic colon.

The effect of gravitation upon the human abdomen has long been emphasized, but in the wrong direction. Since attaining to the upright posture mankind has developed a modus vivendi which, other things being equal, has enabled him not only to survive but to improve his species through the ages, gravitation notwithstanding. The handicap of gravitation and the upright posture has neither killed off the race nor arrested its development. It seems obvious that gravitation should exert its greatest pull on those organs which are relatively large and heavy, and that those individuals born with large colons should be more subject to a gravitational handicap than those born with small colons. This is true, and moreover, since the colon is the heaviest organ in the alimentary canal it is, more than any other part of the canal, subjected to the stress incident to the upright posture. The colon of the carnivore type, commonly seen in the slender or hyposthenic individual, is long in relation to the habitus, is cramped for space and finds it in the lower abdomen. This is not coloptosis, unless it be demonstrated that such a colon is abnormally mobile at the flexures as a result of changes in the application of gravitational force. We wish to emphasize that the whole theory of enteroptosis is mechanistic, that it frequently disregards function and that it usurps a position of importance far above its pathogenic merits. It is true that there is a higher incidence of colon disease in individuals of the hyposthenic type and it is probable that gravitation tips the scale to the detriment of such an individual, but this may be true whether or not enteroptosis be present. Our position is at variance with the teaching of certain writers who have presented the hypothesis that bands, kinks and abdominal adhesions arise in the individual as a result of so-called lines of force, which are supposed often to be characteristic of specialized occupations. This explanation of these intra-abdominal variations is based upon the Lamarkian theory of adaptation or the acquisition of physical characteristics through the exercise of function. However true this may be philogenetically, it is inapplicable to the span of an individual life. The writers are convinced that the anomalies under discussion are almost invariably of chromosomic derivation.

Axial rotation of colon segments interferes with the normal geometric relationship of the circular and longitudinal muscle fibers. Disregarding all other considerations, such torsion of muscle bands and planes can and does produce profound functional disturbance, the severity of which we have had no means of measuring. True elbow deformities of the transverse colon, the majority of which are due to omental dysmorphism, usually combine in varying degree torsion and pressure, constricting or non-constricting, depending upon the character and the site of the insertion of the pressure membranes and the direction in which their force is applied. In any event, the end-result is a physical and neuromuscular disturbance of function. The degree of pressure or rotation produced by these omental and peritoneal variations in the first and second decades of life is relatively slight and often not incompatible with functional competence. During the second decade there begins contracture and devascularization of the fibrous connective tissue comprising these membranes. It is the result of a gradually developing and chronic peritonitis incident to the very pressure exerted upon the colon by the membranes themselves. Long-continued pressure, leading to progressive damage

to the colon wall so as to render it permeable, serves to augment the inflammatory reaction in the membranes, and a vicious circle is thus established. This accounts for the increasing incidence of colonic disease after the second decade.

(1) ulceration of the mucosa, usually microscopic and always minute; (2) atrophy of all the submucous structures with the sole exception of the serosa; (3) chronic inflammatory changes in the serosa. These lesions have a segmental distribu-

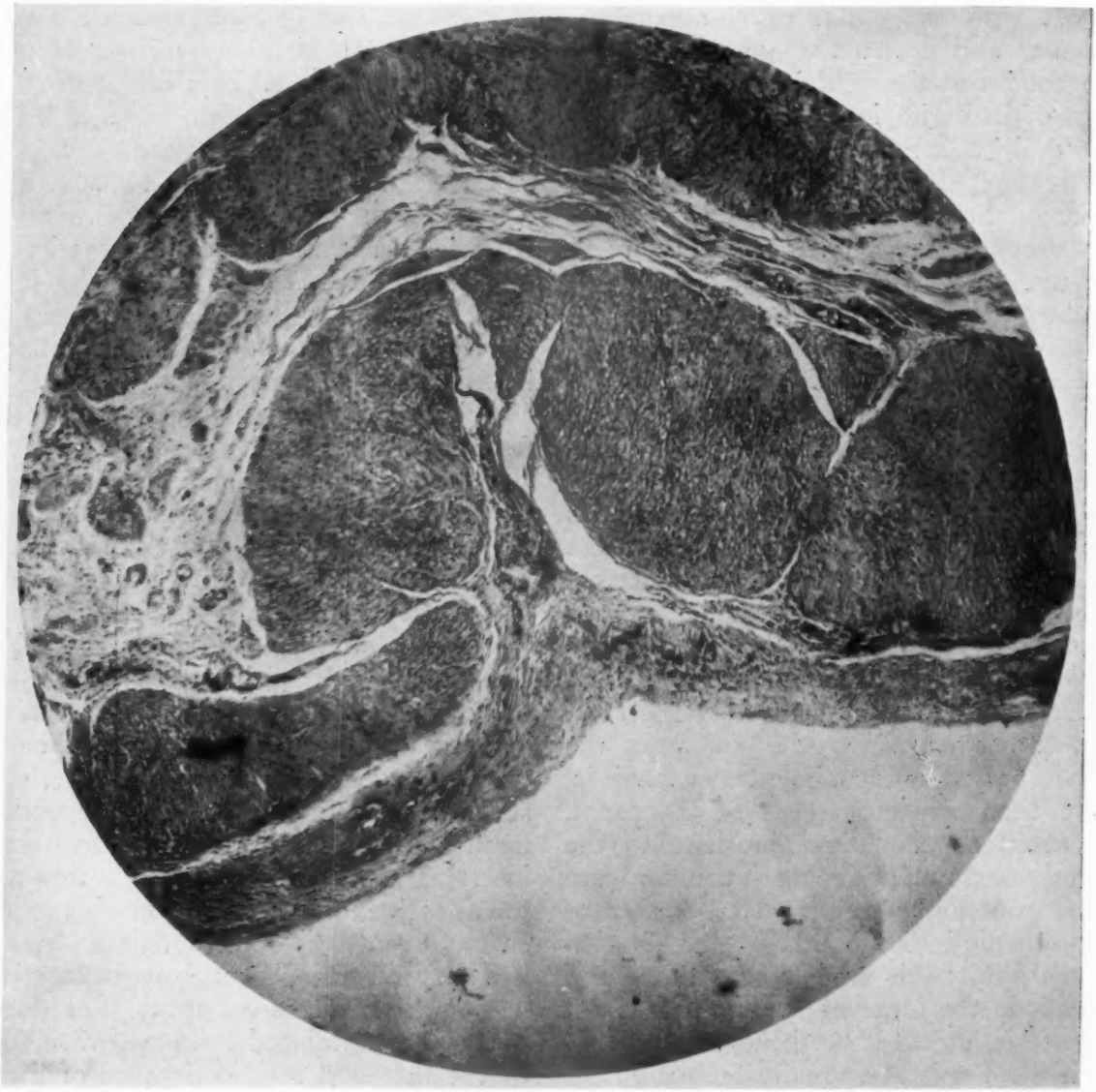

Fig. 8. Chronic peritonitis, with thickening of serosa of colon, in chronic obstipation. This process leads to the formation of bands, adhesions, and kinks. (Interpretation of Draper's material by Dr. James Ewing.)

We are unwilling at the present time to add further to the confusion of the nomenclature as applied to colon pathology. There are no terms briefly and adequately embracing the characteristic lesions under discussion. The typical gross and microscopic findings in the pathogenic colon are:

tion, as already intimated, and are prone to occur beneath the pressure bands. They are rarely found in the sigmoid or rectum and then only in late stages. In chronic ulcerative colitis, on the other hand, the typical lesion appears early and consistently in the sigmoid and rectum and the

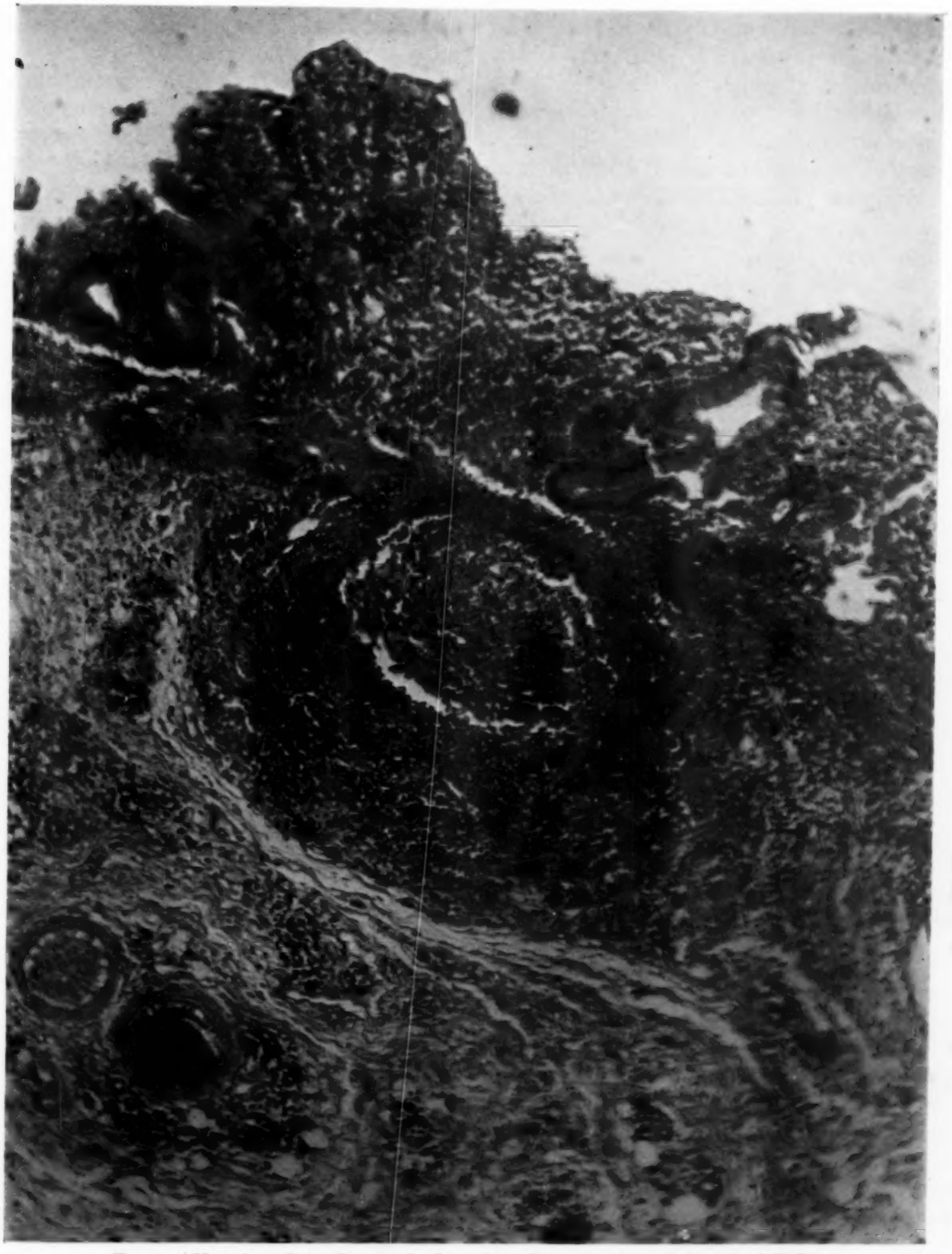

Fig. 9. Chronic colitis. Stercoral ulceration. Hypertrophy of lymph follicle. Edema of submucosa. (Dr. James Ewing.)

changes in the submucous layers tend toward infiltration and hypertrophy rather than toward atrophy. In the pathogenic colon the entire structure of the bowel wall is involved and the term ulcerative colitis or any other accepted term fails to present the complete picture. The keynote of pressure colitis, as we designate it, is atrophy. The fibrosis following certain types of chronic colitis is protective and is seldom encountered in a colon which is truly pathogenic (Fig. 7).

Fig. 10. Case No. 6437. Extremely long sigmoid, transmitted to daughter (Fig. 11). The colon is not degenerated and is not pathogenic.

Fig. 11. Case No. 6547. Redundant colon in eight-year-old daughter of 6437. The sigmoid is large and filled with gas (see Fig. 10).

BACTERIOLOGY

Of the colonic flora nothing of great clinical value is known. Bargen[6,7] has described a gram-positive lanceolate diplococcus which he considers to be the specific cause of certain forms of chronic ulcerative colitis. We cannot doubt that this lesion of the bowel wall is purely intrinsic and may well be due to specific bacterial invasion. Lacking evidence of extrinsic predisposing agents it is logical to seek for a specific organism, and such search should prove fruitful. Many writers dealing with ulcerative colitis have neglected the importance of chronic oral and nasopharyngeal infection, but Bargen very rightly stresses both. His observations and those of his associate, Logan, as well as the laboratory studies of others, notably Torrey,[8] are the beginnings of what may well be a fundamental addition to our knowledge of this disease. Torrey,[9] studying the flora of colon segments from material we furnished, has isolated B. histolyticus. This highly pathogenic anaerobe had been found but once in human feces, but Torrey's method of obtaining colon contents from tied-off segments immediately after total colectomy, as described in his recent article, is strongly suggestive that many important changes occur in the colon flora as the feces flow toward the rectum. In two

patients, one epileptic and one psychotic, upon whom total colectomy had been done by one of us, this investigator isolated B. histolyticus from the terminal ileum and cecum in each case, but failed to isolate it from the colon proper. He says: "In both, it [B. histolyticus] was present in the ileum to at least six inches above the ileocecal valve, and in one of the cases it was the predominant spore-bearing anaerobe in that locality. In the cecums also there was evidence of its predominance and active growth, whereas in both cases the colon seemed to offer unfavorable conditions for B. histolyticus and to permit the overgrowth of another representative of this group, B. welchii." The studies of McClintock[10] upon the occurrence of pleomorphism in an organism which produced pathological lesions in the intestines of experimental animals, while they do not at present have the clinical application to which they may be entitled, none the less have served to indicate the enormous complexity of the whole problem of intestinal bacteriology.

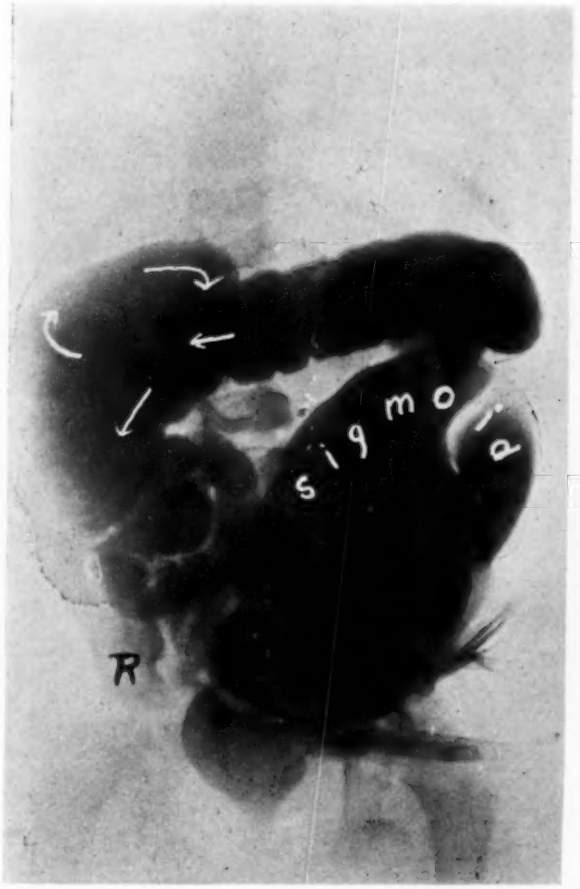

Fig. 12. Case No. 6552. Bilateral omental deviation with megasigmoid in five-year-old girl. Left flexure pulled down, right flexure looped. Mother is an intestinal invalid.

CLINICAL FINDINGS

The symptoms are protean. They run the gamut of the body. They are as evanescent in character as the toxic products which cause them. They are as difficult to describe and as variable as are the symptoms of syphilis, and as in syphilis the final stages of the disease cover an enormous range of disability. The various morbid manifestations are as much dependent upon the reaction of the individual as they are upon the character of the toxins. In spite of this, and again much as in syphilis, there is a certain fundamental symptomatology. Every individual having a pathogenic colon will present in varying degree some or all of the following symptoms: (1) stomach trouble, ranging from

Fig. 13. Typical bilateral deviation of omentum, with constriction and pressure. Marked deformity of descending colon in pressure area. Neurasthenia.

mild fickleness of appetite, abnormal desires or repulsions, abnormal hunger or anorexia, to varying degrees of indigestion, sometimes so severe and accompanied by so much pain as to simulate gastric or duodenal ulcer or even cancer; (2) irregularity

mental and physical. The variable symptoms which are not common to every patient are those which, taken in conjunction with the fundamental symptoms, point to colon pathogenesis. These fall into two sharply-defined groups, the physical and

Fig. 14. Chronic colitis. Subepithelial edema. Heavy pigmentation of stroma cells in mucosa. (Dr. James Ewing.)

of bowel function, with chronic constipation predominating and occasionally alternating with periods of apparent freedom from constipation and even with diarrhea, which is often a form of paradoxical incontinence; (3) bilious attacks in childhood; (4) migrainal headaches beginning about the eighteenth year; (5) exhaustion,

the neuromental. In the first group the symptoms are those common to many joint diseases, notably arthritis deformans; to many obscure and chronic degenerative changes in the heart and kidneys; to certain so-called primary anemias[11]; to many, perhaps all, of the sensitized reactions of the skin and epithelial structures,

notably bronchial asthma, hives and eczema. In the second group the symptoms are those common to neurasthenia, to many degenerative changes in the cord and meninges, and to certain of the functional psychoses.

changes which follow in natural sequence, sometimes with such severity as to result in custodial care! No one can say that all neurasthenics suffer from colon disease, for the minority which is completely studied is very small and the majority

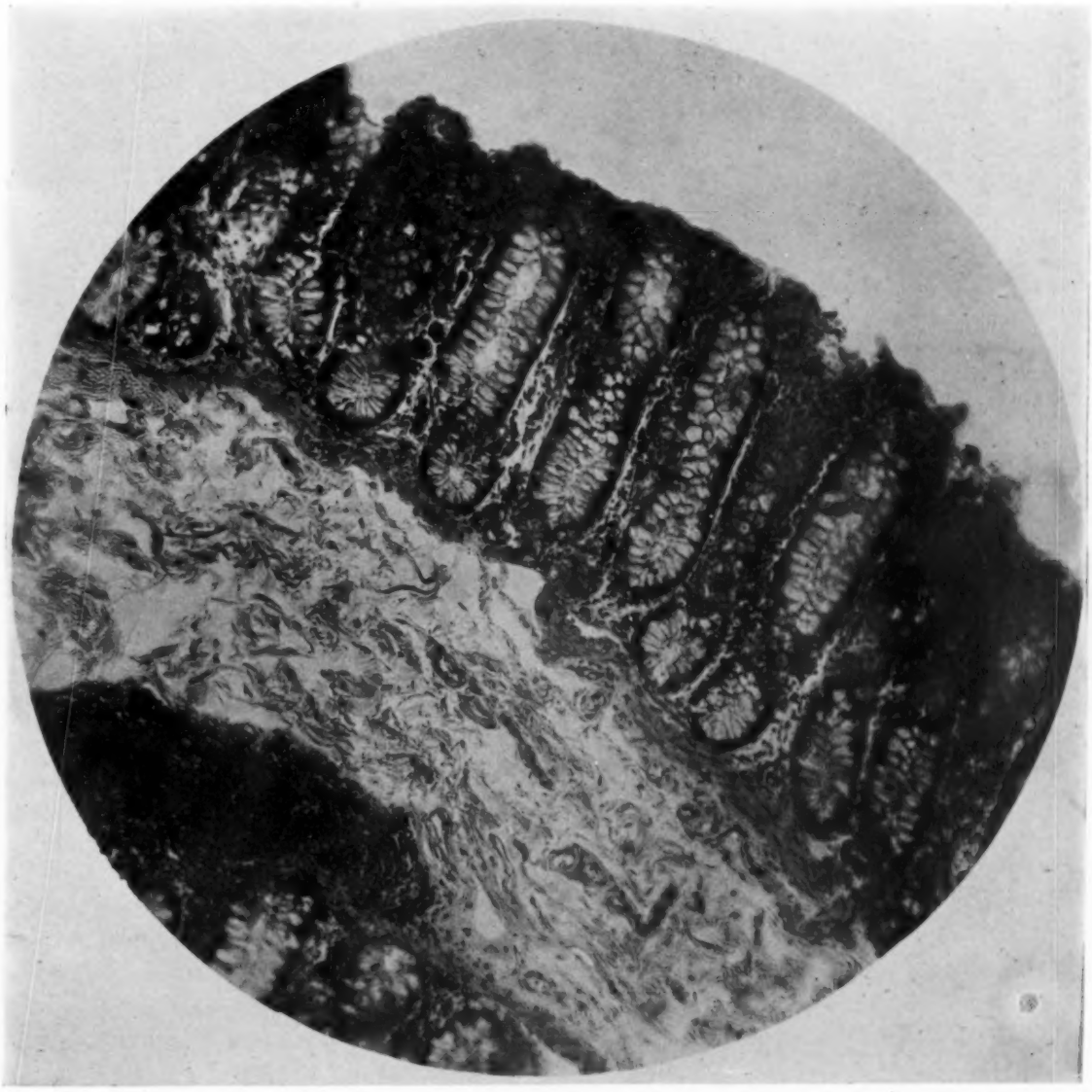

Fig. 15. Chronic colitis. Extreme pigmentation of mucosa. Erosion of superficial epithelium. (Dr. James Ewing.)

Consider the neurasthenic: who is not familiar with the vague but persistent neurosensory complaints of this unfortunate individual, suspended midway between health and disability, unable to work or to play, consistently shunted aside by family and by physician alike! Who has not witnessed the inevitable personality that turns to metaphysics and mysticism is very large. In our experience no neurasthenic is free from evidence of gastrointestinal disorder. This usually involves the colon. Consider the psychasthenic: the term presupposes the separate existence of a soul, or psyche, which has become sick. For those to whom the dualistic theory of

the nature of man is of paramount interest the term is useful if not definitive. To us, as to others who are not dualists in thought or practice, the term adds nothing to the connotation conveyed in the somewhat less abstruse word neurasthenia. Consider the in neurasthenia and chronic intestinal invalidism. There is a history of "bilious attacks" in childhood interspersed with "dyspepsia" and "indigestion." The loss of the appendix in early life with disappointing and sometimes damaging

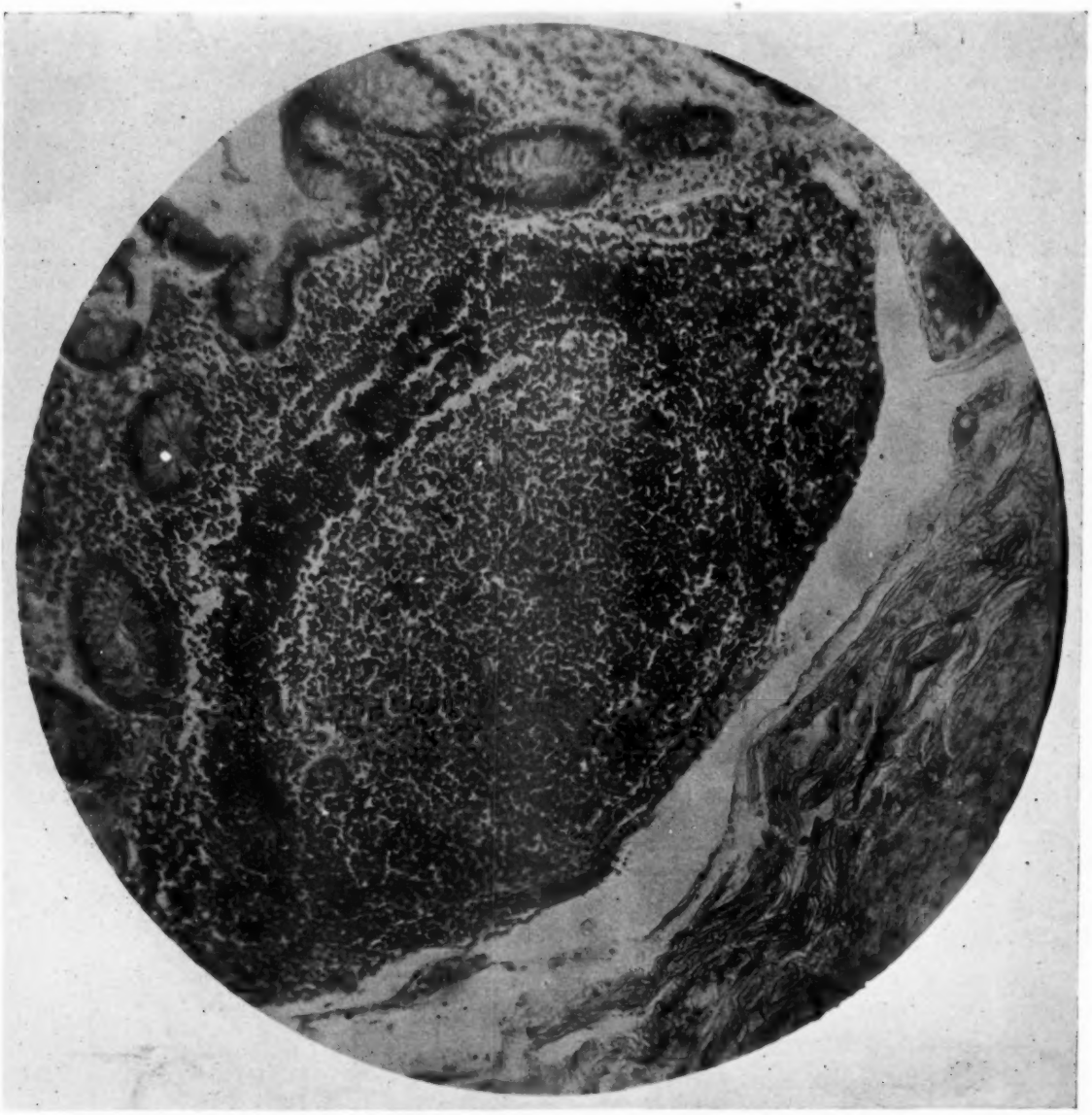

Fig. 16. Chronic colitis. Hypertrophy of mucous glands. Hypertrophy of lymph follicles. (Dr. James Ewing.)

early psychotic: here as in every early morbid manifestation the mental symtoms are vague, hidden, difficult of interpretation and frequently escape detection. The physical symptoms, on the other hand, are always definite, relatively easy to elicit and are usually of a kind with those found results is a frequent story. At about the sixteenth to the eighteenth year it is characteristic that the bilious attacks diminish or cease and that migrainal headaches appear. Constipation usually begins to be definitely noted at about this time, although a history, particularly from the

mother, will frequently elicit a definite story of constipation dating from infancy or early childhood. Infrequently this has alternated with diarrhea. Whatever the subjective symptoms may be, it is imperative for the physician to credit and evaluate the testimony of the patient, no matter how much at variance with probability it may appear and no matter how irresponsible the patient may seem. Many a patient can indicate with astonishing accuracy the position of a partial obstruction. We have found that an immense amount of invaluable diagnostic information can be elicited by careful questioning, even of a patient with the classical symptoms of dementia praecox.

DIAGNOSIS

Thus far the history has thrown the only light upon the patient's condition. The diagnosis of a pathogenic colon remains to be established. The physical examination ordinarily furnishes little information of real diagnostic value, for the patient is not necessarily undernourished, anemic or physically disabled. Low blood pressure and its attendant circulatory deficiency is often manifested in chilled, moist and sometimes blue extremities. Abdominal pressure-pain and rigidity may or may not be present. The laboratory findings vary with one exception. This is the frequently encountered inversion of the white blood cell ratio, a matter we discussed in another article.[12] When present this finding is presumptive evidence of a toxicosis, whether or not it originate in the colon. Stool examination with special reference to protozoa and bacteria is sometimes helpful. The urine frequently contains indican and occasionally melanin. It remains then for the roentgen findings alone to complete the chain of evidence without which the diagnosis of a pathogenic colon is not possible.

ROENTGENOLOGIC DIAGNOSIS

Thorough-going routine examination of the alimentary canal by the usual opaque serial meal should be completed in all cases. Usually it furnishes nothing more than a lead as to what may be expected with regard to the colon. The findings based upon the opaque meal alone are vague, incomplete and sometimes absolutely misleading. Therefore, examination of the colon by means of the opaque or semi-opaque suspension, injected rectally, should never be omitted. Frequently the opaque enema furnishes the only clue to the diagnosis, the serial examination having been entirely negative. On the other hand, reliance upon the opaque enema alone is dangerous, inasmuch as information thus obtained is incomplete, not only with regard to the colon itself but also to the remainder of the alimentary canal.

In considering the colon, the information gained by study of the serial meal relates largely to function. Alterations in motility may have real significance. Again they may have none. If the colon is empty at forty-eight hours it is wise to ask if a cathartic has been taken. This inquiry should be made of any habitual laxative user. On the other hand, if the colon remains filled at forty-eight or seventy-two hours, consider what has been the mode of life of the patient during the examination. Has he been inactive when usually active? Has he been subjected to excessive strain and worry with its attendant psychogenic effect upon peristalsis? While we hold that psychogenic influence upon the alimentary canal is transient, it is none the less potent. For if peristalsis in the cat ceases instanter upon sight of the detested dog, is it not probable that peristalsis in the human also may cease at sight of the doctor? Todd[13] has demonstrated this clearly in his work upon first and second year medical students. Moreover, the reliability of barium sulphate by mouth as a motility determinant is open to grave question. Its reaction is rather that of a foreign body which is capable of undergoing a great variety of physical changes in different hosts, than of the inert substance which it is

generally supposed to be. Its high specific gravity and its faculty for becoming glued together in hard masses by intestinal mucus are the principal objections to its use.

Barium detention in any part of the colon for a period of forty-eight hours or more requires explanation. It is not in itself ground for a diagnosis. Such detention in the cecum is common and is not necessarily pathologic. It may be physiologic, for the cecum, an independent storage viscus in certain closely allied mammals such as the horse, is preeminently the storehouse of the colon. Detention in the appendix is infrequent and when present may have no significance whatsoever. Moreover, an inflamed appendix is intolerant and will not store cecal contents unless forced to do so by reason of an obstructive lesion aborad to it. Retention in the entire colon leads to the assumption of rectal or rectosigmoid obstruction, spastic or otherwise. This assumption is frequently incorrect. It may be related to the presence of pressure membranes anywhere on the left side, as well as to chronic inflammatory changes in the female pelvis.

It occasionally happens that the serial meal indicates the presence of mucus in the colon, the so-called string shadows. It is by no means improbable that certain of these peculiar barium distributions appearing as stringy or ropy shadows are significant of much more than the mere presence of mucus-coated barium. The writers have observed at the operating table that in highly decompensated colons there may be found striking detention of fecal matter in all the haustral pockets of any given segment of the gut, and this in spite of thorough preoperative catharsis and irrigations. Upon opening such a colon this putty-like fecal material has been found adhering closely to the bowel wall. Ropy or stringy barium shadows may have been observed under such conditions. Sometimes valuable information with regard to the position and mobility of the colon is furnished. Sometimes diverticular pockets may be seen. Sometimes an annular obstruction is pointed out. Sometimes an angulation, an axial rotation, or a constriction due to pericolic membranitis is suggested. It will be noted that all this evidence is suggestive, often difficult to find and more difficult to interpret. We repeat, examination of the colon by the opaque enema must follow the serial meal, or the conclusions may be worthless.

The enema must be given under proper control, after adequate preparation and with standardized technique, must be roentgenoscopic as well as roentgenographic in its scope and should not conflict with the serial study. The manner in which the barium column advances should be carefully noted. There are points where it is normally delayed, namely the rectosigmoid juncture, the sigmoid-descending juncture and the two flexures. Other than momentary delay at any other point may be of pathological import. Unusual loops, angulations or constrictions which appear before the colon has become filled are frequently wiped out under the influence of increased intracolic tension and their significance, if any, is lost unless carefully recorded. If such deformities persist after controlled filling of the bowel, and this can usually be determined by digitation, there is little doubt that these are organic defects and not illusions resulting from redundancy or temporary spasm. By controlled filling we mean the method by which the filling of the bowel is checked roentgenoscopically at all stages of the procedure, first to insure adequate filling and second to avoid overdistension and the misinterpretation resulting therefrom. It is impossible that this can be accomplished by any form of volumetric calibration alone, because obviously each colon has its individual capacity and tone. The manner of filling together with the volume are the criteria upon which more nearly accurate conclusions as to colon capacity should be based. Moreover, the factors of hydrostatic pressure, temperature and viscosity should be constant for any given observer, so that

he may make at least reasonably accurate estimations of speed and filling capacity. The pressure used, when within reasonable limits, is immaterial so far as it affects determination of morphology, tonicity and capacity. The pressure together with the viscosity are the factors which determine the velocity of the fluid as it is delivered to the rectum and therefore these determine the speed with which the hollow viscus, tonic or obstructive considerations aside, will be filled. Were it not for these inconstant factors of muscle tone and unforeseeable obstructions, the capacity of the colon could be measured accurately by means of a stop watch and a mathematical formula. A determination of colon capacity, therefore, depends absolutely upon a proper appraisal of these two most important inconstant factors. Knowing from experience the speed with which the fluid is delivered to the rectum and knowing the average length of time which will pass before it reaches the cecum of an unobstructed orthotonic colon, estimation of the tone may be made as the colon is filling merely by observing the speed with which the barium advances. Rapid, almost instantaneous advance occurs between the normal delay points in an hypertonic unobstructed bowel, with barium frequently reaching the cecum long before complete filling has occurred. A slow, irregularly advancing column with more or less complete filling of the bowel as the column progresses is characteristic of an hypotonic colon. Being familiar with the constants and bearing in mind tone characteristics, it is possible to formulate an opinion as to the quantitative value of any obstruction encountered during the progress of the fluid merely by appraising the time factor of delay. It reveals little, however, as to the character of the obstruction. We wish to know whether the lesion is intramural and organic or spastic, or whether it is extramural and due to pressure from congenital or acquired abnormalities.

Gross angulations of the transverse colon are encountered with great frequency. Here the angulation is almost always directed caudad and is more frequently seen on the right side, where the

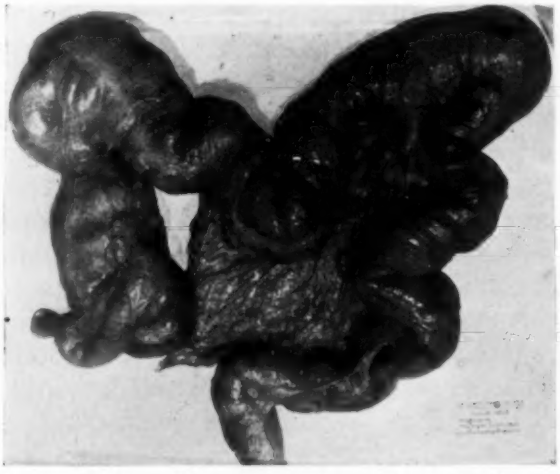

Fig. 17. Case No. 4223. Megacolon, capacity 10 litres. (Wax reproduction.) Female aged thirty-five. Dementia praecox and multiple sclerosis. Duration of symptoms fifteen years. Colectomy. No improvement.

Fig. 18. Case No. 5661. Megacolon with constricting right omental deviant. Impossible to fill right side. Degenerative changes of entire bowel. Epilepsy, grand mal.

transverse colon is reflected or imbricated over the ascending in varying degree. Such a condition is by no means always inconsistent with adequate function. We use this phrase advisedly, never having been able to establish a true normal for the human colon. Left-sided imbrication is frequently nothing more than enforced angulation produced by disproportion between the width of the patient and the length of the transverse colon. If this be so, such an angulation is easily displaceable upon digitation and there will be found no evidence of constriction or extracolic pressure upon it or upon the descending bowel over which it lies. In any event it is important to learn, if possible, not only the amount of imbrication but the degree of fixation, constriction and pressure which accompany it. This can be accomplished only during screen examination.

There are further important observations which depend upon fluoroscopic study alone. The significance of spasm is always difficult to evaluate. All the elements entering into the occurrence of spasm must be considered. When, as well as where, does it occur? How long does it last? What is its relation to pain? Is it fleeting, constant, intermittent or recurrent, increasing or decreasing, always in the same place or cropping out in different segments? Finally, how is spasm manifested? Spasm appearing early and in the absence of considerable intracolic pressure is diagnostically significant, providing that the element of fear or other psychogenic considerations are absent and providing that the colon has not been too recently irritated by a cathartic or by other drugs. Spasm appearing late and in the presence of colon distention may mean merely an expulsive effort on the part of a healthy colon and in this event the spasm will be inconstant and temporary. If it is persistent, it should be considered as having possible pathological significance. Spasm occurs most frequently on the left side. This is usually a physiological reaction, since the left side is more concerned with motility than with storage and is therefore less tolerant of distention. This is true equally of the descending and pelvic colons. Spasm in the ascending colon and cecum, whether early or late, should be regarded critically and if any doubt remains the examination should be repeated. Spasm of the transverse colon likewise should be regarded with suspicion, always bearing in mind the possibility of a pressure defect from the spine. Spasm that is fleeting and migratory may be disregarded. Momentary recurrent spasm of the same segment may not be disregarded. Spasm that appears early, persists and is accompanied by pain should never be disregarded. The onset of spasm in any part of the colon is usually manifested by disappearance, more or less complete, of the opaque material from the segment involved. This may occur so suddenly as to escape the attention of the roentgenologist until it is completed, or so slowly that it likewise fails to attract attention. In barium mixtures which are not adequately suspended this segmental evacuation may be mistaken for sedimentation of the barium or vice versa. Pronounced exaggeration of haustral demarcation should not be mistaken for spasm, this being merely an exaggeration of normal characteristics rather than a true spastic state. Rarely, spasm is unaccompanied by segmental evacuation, and the changes produced by it are so slight that they can be seen upon the screen only with difficulty. Such spastic manifestations are probably the result of fibrillary contractions associated with disorganized haustration, and produce a fine feather-like outline in the contour of the bowel. This is very often significant of well-established ulcerative colitis in which the neuromuscular elements have been damaged sufficiently to produce incoordination, and is clinically comparable with the fibrillary contractions of heart muscle. Whether the term spasm is justified in its usage here is of small

importance. The word fibrillation as applied to colon musculature is not yet in general use, although it was introduced by Mills[14] three years ago.

Spasm of the sphincters, anal, recto-sigmoid and ileocecal, is usually impossible of detection excepting by inference. In this connection a word concerning the so-called incompetence or insufficience of the ileocecal sphincter is pertinent. Regurgitation of the barium suspension into the terminal ileum, after the cecum has become sufficiently distended, is to be expected and has no significance unless it occur very early. If a shadow appears in the terminal ileum as soon as the barium has reached the sphincter there is every reason to suppose that the muscle is incompetent, and in such a case enormous leakage into the small intestine will continue so long as barium is allowed to flow into the rectum. On the other hand, if the terminal portion of the ileum fails to fill after complete distention of the ascending colon and cecum, and does not fill for some minutes thereafter, a reasonable assumption of obstruction, spastic or otherwise, is in order. The causes of such obstruction are not easy to differentiate. Spasm often predominates, but there are unquestionably a great many instances where it plays little if any part. Adhesions involving the neck of the ileum in torsion or angulation are sometimes suggested when a small part only of the terminal ileum is visualized. Obstructive lesions of the ascending colon, many of them due to omental deviants, are prone to cause motor delay in the terminal ileum, and in such cases the ileocecal sphincter may be spastic, incompetent or may have remained functionally normal. In young subjects nodular hyperplasia of the mucous membrane of the terminal ileum may constitute an intrinsic source of partial obstruction. Fibrosis of the sphincteric muscles may result either in incompetence or obstruction. In general, it will be found worth while to search patiently

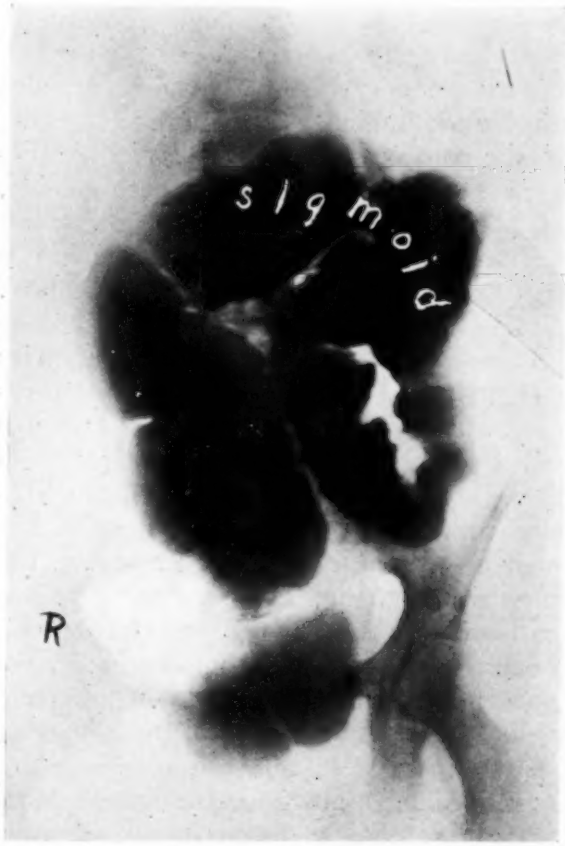

Fig. 19. Case No. 6427. Megacolon in female aged twenty-two. Dementia praecox. Only the sigmoid is visualized. Complete filling would have been dangerous, the colon wall being like parchment (see Fig. 20).

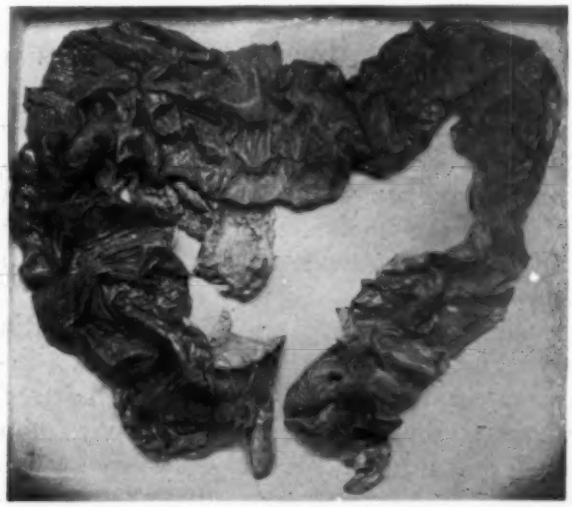

Fig. 20. Case No. 6427. Photograph of formalin-fixed megacolon following colectomy. (See Fig. 19.) The bowel has been opened; note paper-like thinning of the wall. Dilatation is present but it is the *result* of atrophy, not the cause of it.

for localized or remote lesions which may be responsible for functional irregularities of the ileocecal sphincter, for almost invariably such lesions can be found. Spastic manifestations of the anal sphincter do not fall directly within the scope of the roentgenologist except on rare occasions. Spasm of the rectosigmoid sphincter is not easily detected unless it be of sufficiently severe degree to cause a noticeable increase of the usual delay to the opaque fluid at this point, as well as a definite exaggeration of the divisional incisura between the rectum and sigmoid.

The human colon always presents certain well-defined characteristics of *size*, *contour* and *position*. The roentgen-ray film is of value principally with regard to the information it records concerning these three elements.

Correct evaluation of *size* variations is always difficult and especially so in children. In adults a rough estimation based upon the fluid capacity of the empty colon may be possible, but the accuracy of this estimation depends more upon considerations of habitus than of body weight. In children the determination of habitus is difficult, if not impossible, and can usually be arrived at only by inspection of the parents, comprising if possible roentgenological study of their colons. The diagnosis of true megacolon is not difficult. Hirschsprung's disease is nothing more than pronounced megacolon in infancy, in which the degenerative changes are sufficiently established to permit of pathogenesis. This shortens life. Megacolon is found in adults and is congenital, but it has escaped the label of Hirschsprung's disease because it did not degenerate in childhood. Megasigmoid and megacecum, so-called, and also cecum mobile, are found from childhood to old age, but the mortality rate is high, life expectancy depending upon the onset and progress of degenerative change. In addition, these congenital variations in size may be further modified later by the processes of dilatation, elongation and contracture discussed elsewhere.

Early *contour* changes are frequently missed at screen examination. We have spoken of the feathered contour as being rather definitely suggestive of the fibrillary spasm incident to an ulcerative colitis, but we cannot be too certain that it is not also produced by other less definitely understood forms of colon disease. The interpretation of every variety of contour change in the colon is difficult and depends upon a knowledge of the underlying mechanism by which colon contour is controlled and maintained. For the sake of brevity we may disregard the roentgenographic effect, if any, of colon mucosa upon colonic contour. Certain hypertrophic diseases of the mucosa do change the outline, but their incidence is rare and not within the scope of this paper. Diverticulosis is common, but is not confined to the mucosa.

It is obvious that the contour of a hollow viscus is dependent to a large extent upon its muscular form and function. The arrangement of the colon musculature is complex and the contour changes resulting from disturbance in muscular balance are likewise complex. The circular fibers of the inner layer comprise the larger part of the colon musculature. They are more or less uniformly distributed but tend to group themselves in bundles which are supposed to correspond to the normal intersaccalations of the colon. It is improbable that these fibers exert more than secondary influence in producing sacculation. Increase in their activity leads to broad incisurae which sometimes simulate true haustra very closely. Overactivity of the circular fibers may accentuate haustration, but it more frequently interferes and leads to confusing contour changes. The longitudinal muscle layer is the external one and is spread thinly over the wall of the colon excepting at the three points in its circumference where the taeniae coli are laid down. It is the longitudinal fibers which are largely responsible for the colon sacculations, and disorganization of these fibers, hypertonic or hypotonic, results in an increase or a decrease in the quantity and quality of the

haustral markings. When the colon musculature is subjected to any abnormal stimulus certain contour changes become apparent, depending upon the character of the stimulus. An irritant attacking the circular fibers produces abnormal activity, this resulting in any degree of contraction from an incisura to total spasm of a segment. A degenerative irritant which destroys as it invades, when attacking the

Fig. 21. Photograph of specimen showing remnant of right omental deviant, transverse to ascending.

circular coat leads to varying degrees of dilatation without particularly disturbing haustration. Irritation of the longitudinal fibers may lead to exaggerated haustration complicated by the contour changes produced by circular disorganization. Degeneration of the longitudinal fibers, on the other hand, leads to relaxation and decrease or loss of haustration. Thus degeneration of circular fibers leads to dilatation, and degeneration of longitudinal fibers leads to elongation of the colon. The first results in obvious increase in diameter, the second in folds or reduplications compensating for the added length. Muscular irritation which is chronic, persistent and ever-present, but of comparatively recent origin, produces that kind of conjoined dystonia of both circular and longitudinal fibers which has been characterized as fibrillation and which affects the contour in the form known as feathering or serration.[13] It is significant of the presence of an active and degenerating irritant. Thus the end-result of degenerative processes is inevitably either muscular atrophy and dilatation or muscular atrophy plus fibrosis leading to contracture. In each case, muscle atrophy finally leads to permanent change of contour.

As developed in the discussion of enter-

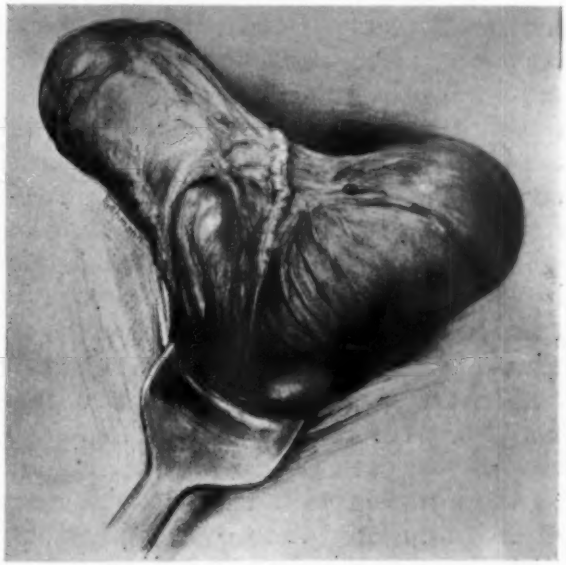

Fig. 22. Right omental deviant crossing ascending colon to become adherent to lower pole of right kidney, with extreme angulation of and pressure upon the bowel.

optosis, consideration of the *position* of the colon as a whole or in its parts frequently leads nowhere, perhaps serving only to confuse rather than to enlighten. Definite displacement and unusual mobility of the flexures, when not due to dislocation or enlargement of the liver or spleen, are significant if one can be sure that abnormal mobility is present. This distinction is not easy, for the flexures are very difficult if not impossible to palpate and reliance must therefore be placed upon the effect of postural change. The splenic flexure and, to a lesser degree, the hepatic are subject to traction and distortion by longitudinal and encircling bands and may be displaced caudad or mesiad, or both, not because of relaxation of the mesentery primarily, but

because of contracture of congenital or acquired investiture. In every other respect so-called abnormal position of any part of the colon will be found to be a placement imposed upon it by intra-abdominal pressure. The finding of the cecum in the true pelvis, sometimes to the left of the midline, is characteristic of megacecum and cecum mobile rather than of ptosis, since the pendent mesentery is of developmental rather than acquired origin. It occasionally happens that in the case of a very long ascending colon the cecum will not be displaced from its usual position in the right iliac fossa. If this be so, it will tend to be fixed in position, capable of upward but of very little downward displacement, and the ascending colon will be found to be bent or folded upon itself in various ways. The cecal fixation then is from above and is very often the result of investiture from an embryologically aberrant omentum (Fig. 6). Which of these two forms of cecal dysmorphism carries the greater pathological import, the large ascending colon with a low mobile cecum or the large ascending colon with a high fixed cecum? It is the latter, for the cecum is not in its correct position as related to the ascending colon, and the folding of this portion of the bowel is functionally embarrassing. This takes no cognizance of the additional effect of omental pressure upon the ascending colon or of the direct transmission through the omentum of gravitational drag to the transverse colon, duodenum and stomach, now called upon to carry a heavy cecum which should derive its support from its own mesentery. With regard to the position of the appendix we may say briefly that it lies, and lies, and lies. Roentgenologic study of the appendix is usually about as reliable as the cackle of the Missouri hen, loudly proclaiming that she might have laid but has probably lied.

Summary. It is apparent that the roentgenologic diagnosis of colon disease is complicated. It is also an undeveloped field. First, there is no accepted normal, each individual being a law unto himself. Second, the presence of demonstrable alteration in colon morphology must be interpreted in the light of all the elements entering into it. Colon irritability as shown by spasm or other functional disturbance may be the result of an emotional upset, of a drug or of an intrinsic colon lesion. Colon hypotonia may be due to unnecessary and too-prolonged clysmatic pressure, with resultant dilatation and decrease in haustration, or it may be due to a degenerative process. In the latter case there will almost always be found some embarrassing deformity of the bowel which is etiologically related to it. These deformities may be real or apparent. If real, there will be found greater or less fixation, pressure or constriction; if apparent, these are absent. Dysmorphism associated with abnormally large segments of colon is likely to be of congenital origin and when not so associated may still be congenital, although the roentgenologist is unable to say this unless he has similarly examined other members of the same family. This opens up a field of roentgenological endeavor which has heretofore been unexplored.

TREATMENT

The therapeusis of patients suffering from chronic colon pathogenesis must be based upon the most careful and conscientious analytical study, and above all, must be deliberate. This course is almost invariably contrary to the wishes of the patient who hopes and expects that treatment, to him all-important, shall be instituted at once. Beware of the confusion of contemporaneous diagnosis and therapeusis. Perhaps even more definitely than in disorders of other parts of the body, successful treatment of those of the alimentary canal depends upon knowledge of its intercorrelation and recognition of its integrity. Specifically we refer to the coexistence of a colitis of whatsoever type with chronically infected teeth, tonsils and sinuses. On account of the difficulty attendant upon its elucidation, the direct

path by which such infections serve to maintain degenerative involvement of the colon will probably long remain unknown. Empirically, however, it can easily be shown that extensive clinical improvement may be expected to occur in a diseased colon if the oral sepsis is removed before any therapeusis is applied directly to the colon. Parenthetically, this is true of the common pelvic infections, endocervicitis and vesiculitis. Here the relationship is one of contiguity rather than of continuity, but clinical results show that it is none the less important in instituting treatment.

After a proper interpretation of the roentgen-ray studies it is often possible to say at once that the therapeusis of a given case is surgical. We refer of course to instances of partial obstruction due to congenital or acquired abnormalities which have resulted in such positional changes as to cause severe colon disorder. These must first be relieved by proper surgical intervention and must then be treated medically for a long time. We cannot overemphasize that this is true of every case treated surgically. Nothing could be more disastrous to the cause of progressive therapeusis of diseases of the alimentary canal, about one-third of which are surgical, than the common failure to combine these two departments of medicine. Naturally and properly interlocked, they are too often kept dissociated or even at variance by unfortunate prejudices or failures in cooperation.

For the well-defined, basically medical cases of colitis many rational and successful forms of treatment have been devised. There remain, however, some which may properly be looked upon as borderline in type. It is in this rather small group that the occasional use of medical therapy for the purpose of aiding in final diagnosis is justifiable. It is unnecessary to emphasize the fact that the abdomen must never be opened unless in the experience of the observer definite good is to result. Patients upon the border of intestinal invalidism face two types of mortality: that arising from action based upon surgical intervention, and that arising from delay. The former is well recognized and is properly charged to the surgeon. The latter is known but is rarely discussed. When we shall have learned to recognize the great frequency with which the pathogenic colon destroys life through secondary destruction of vital organs there will be less delay in attending to the early diagnosis and treatment of colonic lesions.

The surgical cases fall into three general groups. The first includes those patients whose colons are distorted and damaged by omental deviants or other bands of congenital or acquired origin. If the dysmorphism is not too severe and particularly if not of too long standing, this form of pressure colitis can be permanently cured by simple section of the constricting membranes, including omentectomy. Obviously everything depends upon an early diagnosis, and it is therefore important that children be thoroughly studied, especially those whose parents or grandparents are known to have congenital colon dysmorphism. If the patient has been operated upon it is of course possible that chronic colon disease has been engendered by postoperative adhesions, but in our experience this is rare and does not occur unless a long postoperative interval has elapsed. We regard this as significant evidence that it requires many years to break down colon compensation and that the view is correct that a high degree of colon resistance explains the frequent absence of colon pathogenesis until the twenty-fifth year.

The second group comprises those patients with all types of megacolon, with or without evidence of pericolic adhesions. It is bad surgical practice ever to open the abdomen of such a patient without first having subjected him to an exhaustive course of medical hygiene and therapeusis. It is likewise bad surgical practice to open the abdomen of such a patient, electively, unless prepared to remove the

colon in toto. These patients are invariably damaged by less radical measures, such as the removal of the appendix or the liberation of adhesions. As a rule, adhesions are either absent or of little consequence.

The third group comprises those patients in whom the evidence arising from a synthesis of the historical and roentgen-ray data has proved the existence of well-defined colonic pathogenesis. Immediately upon opening the abdomen of such a patient the colon will be found to be compressed, dilated, contractured, angulated, axially rotated, one or all. There will be found deep hernial sacs at the bottom of which digitation and inspection will reveal a severe degree of atrophy of the wall. Microscopic study of such areas[15] will often show that all the coats except the serosa have been damaged or destroyed. Chronic localized peritonitis is often associated with the inadequate protection of this thin coat. This view is further confirmed by the observed fact that acriviolet dye, when introduced as an enema while the abdomen is open, has been seen to pass through such damaged segments of gut as above described in sufficient quantity to stain a piece of gauze which is gently wiped over the serosa. A colon so damaged will usually emit a fecal odor that can be detected some distance from the operating table. This is often as well defined as if the bowel had been punctured and is, in itself, an important justification for colectomy. Partial colectomy is rarely indicated because the mortality is nearly as great as that of total resection, and the results by no means as good. It is not unlikely that one reason for this lies in the fact that if a colon segment is left in situ there is a backwash into the small bowel, the ileocecal sphincter having been removed. This explanation is irrelevant in the case of partial removal of the left side of the colon in those cases where the disease is localized in this area, and it is interesting to know that the removal of left-sided segments leads to better clinical result than right hemiresection. The matter of surgical technique is not relevant here, having been presented in a previous paper.[1]

When surgical measures are not indicated or when they are not feasible it usually will be found possible to map out a course of medical and hygienic therapeusis which, carefully followed, will succeed, at least in part, in effecting substantial though transient improvement. A frequent and discouraging reason for failure is the uncooperative attitude of the patient. Occasionally this is due to a congenitally subnormal intelligence, but more frequently it is the result of personality changes engendered by the colonic disease. In the latter case a heavy burden is placed upon the physician and he must develop a tolerant philosophy and insight; he cannot otherwise hope for any measure of success.

The influence of diet in the production of colonic pathogenesis is probably slight, therefore little can be expected from dietary therapeusis alone. A rational diet based upon the needs of the individual is of course necessary. It should as a rule be low in animal protein and should never exceed the caloric requirements of the patient. Narcotics, alcohol and laxatives should be withdrawn as soon as possible. Every effort should be made to overcome constipation without the use of laxatives excepting cold pressed castor oil, the occasional use of which in large doses is of great value. Belladonna is a useful palliative remedy, particularly in the long months of medical care following operative intervention. The use of iron or other drugs directed toward the alteration of abnormal blood pictures is useless excepting for a brief time. The so-called intestinal antiseptics are worthless with the possible exception of certain organic mercury compounds and a few aniline dyes, such as acriviolet. This inhibits both gram-negative and gram-positive organisms, penetrates some distance into the tissues and is relatively non-toxic. It must not be forgotten that it destroys B. acidophilus and should never be administered in conjunction with it. Acriviolet, to be effective, should be applied

in concentrations stronger than 1:1000. It has been found impossible to use it in colonic lavage in concentrations greater than 1:5000 and we do not regard this procedure as the one of choice. There are various methods advocated for its use by mouth and occasionally oral administration is very successful. We have used it in combination with agar, but are unprepared at this time to give an opinion as to the success of the method. It is of value in this form in certain types of ulcerative colitis, notably those in which the bacillus described by Bargen appears to be predominant and where the stools are mucopurulent, bloody and excessive. Acriviolet, as would be expected, is less definite in its effect on the various forms of pressure colitis where the primary cause of the disease is extracolic. It may be remarked here that the typical ulcerative colitis with which all are familiar is not necessarily associated with congenital defects but is, on the other hand, almost invariably related to infection in the oronasal cavity. These sources of infection must be removed before acriviolet or any other agent can effect substantial recovery.

Attempts to implant B. acidophilus upon the colon mucosa are not always successful. Even when successful, the benefit to the patient is not always noteworthy or permanent. In the face of gross deformities and pressure lesions in the colon wall, which as stated are extracolic in origin, B. acidophilus is useless. It is occasionally of value in counteracting constipation, but only where the colon is not deformed, congenitally or otherwise.

Autogenous vaccines capably prepared from predominant strains of pathogenic colon flora are effective in the relief of symptoms but not in the cure of lesions. It is hardly necessary to state that anatomical abnormalities of the colon are not susceptible of any definite modification from vaccine therapy. However, we have noted a number of individuals in whom a functional improvement has occurred, as shown by our follow-up roentgenologic studies. Whether or not the vaccine therapy is wholly responsible for such change we do not know, for other measures have been employed in conjunction with the vaccine. Nor is it known to what degree vaccines may be specific. Anti-sera for certain strains of B. coli and streptococci have been prepared and clinically studied over a number of years, but with the result that their value is still problematical. It is known that certain extremely toxic anaerobes are not infrequently found in the alimentary canal. Ten years ago Bull[16] developed an antitoxin for B. aërogenes capsulatus which was successful in the treatment of both local and systemic invasion of this organism. It is possible that such work as this may have far reaching effect in the treatment of obscure gastrointestinal disorders associated with anaerobic parasitism.

Colon lavage, so widely in vogue, is useful in old people. It is also frequently harmful, leading to added dilatation where dilatation already exists and in one case under our observation to sudden death from perforation. And yet this measure, supposedly harmless, is widely used and not always under medical direction. Artificial abdominal support or corseting is used with two objects in mind. Multipara with divulsed recti certainly need support and are benefitted by it. The same applies to any weakening of the abdominal wall which is not amenable to surgical correction. The second indication is the mitigation of definite ptosis of any intra-abdominal viscus, providing this can be achieved. If appliances do not afford positive support they are not only useless but usually detrimental. The use of physiotherapy is being much indulged in of late. We have no animus with regard to it if used rationally. The value of the intensive use of actinic radiation to the point of inducing excessive pigmentation and exfoliation of the skin of the abdomen is open to question. Medical diathermy, so-called, is a symptomatic form of treatment so far as the chronic and persistent infections are

concerned. In other respects we have no arguments against it and none for it.

We have long felt the want of comprehensive and correlated research relating to the problem of colonic function and pathogenesis. Much has been written about the isolated infections, neoplasms and functional disturbances of the colon, without any attempt having been made, so far as can be found, either to correlate the whole subject upon an anatomical and physiological foundation or to consider disease of the colon in its fundamental and all-important bearing upon somatic disorders. Casual discussion of these problems with able practitioners of medicine has frequently evoked interest, but a constructive response only rarely. The birth of an idea is laborious. We are particularly grateful to those of our medical associates and friends, notably Dr. James Ewing, whose open minds and helpful criticism have from time to time stimulated and reinspired a work which cannot be carried on except under great difficulty, for the course is uncharted and the path easily lost.

CASE REPORTS

Case No. 6143. Male, aged thirty-one. When ten years old, had scarlet fever complicated by nephritis, and a long convalescence. Patient had no recollection of intestinal trouble or constipation during childhood other than a severe attack of diarrhea lasting a month at twelve years of age. In the same year he had pneumonia followed by persistent bronchitis which continued throughout adolescence. During his second year at Yale his appendix was removed because of severe abdominal pain. It is important to note that the involvement of the appendix was negligible. From his nineteenth year on, while in college, he began to be troubled with constipation, and he was obliged to leave college for a year because of a "nervous breakdown." This developed into a mild psychosis with depression, suicidal thoughts and a religious trend. *Constipation became progressively severe.* Because of unusual aptitude he graduated with Phi Beta Kappa honors. At twenty-six he was obliged to give up his studies in a theological seminary because of a "nervous breakdown" similar to the previous attack. At this time he lost thirty pounds in weight. He spent three years in Colorado seeking to regain weight and health without success. At thirty, following a pulmonary hemorrhage, he was found to have tuberculosis. He went to Saranac for a year. It is interesting to note that he gained ten pounds during the first six weeks and then developed "indigestion" with loss of all the weight gained. He was first studied by us during the summer of 1925. Roentgenological diagnosis was as follows: chronic segmental pressure colitis tending to become generalized; evidence of knotting and constriction at the splenic flexure; obstructive pressure lesion orad to hepatic flexure; probable bilateral omental deviation; chronic tuberculous infiltration of lungs, both upper lobes; sputum positive. Patient returned to Saranac in November 1925 following an attack of pleurisy. Intensive actinotherapy at Saranac, leading to extensive pigmentation, dessication and exfoliation of skin of entire abdomen.

Total colectomy June 4, 1926. Aside from the colonit self the principal pathological condition was an extensive mesenteric adenitis. No milliary tubercules were found. The splenic flexure was bound down by a left omental deviant, there being less marked omental involvement of the hepatic flexure (Fig. 4). The middle portion of the omentum was atypical. Excision of entire colon with about 15 cm. of terminal ileum; mesenteric marsupialization. This patient has had no gastrointestinal symptoms since the operation. Examination of the chest and sputum have been negative for active tuberculosis. By the third month after operation the patient's mental condition had begun to improve and he began to read not only ordinary books but also Greek. He stated that the entire twelve years since graduation had been more or less of a blank, but that he now felt almost as alert mentally as during his early days in college. Strong hereditary history (Figs. 4, 5 and 6).

Case No. 4950. Female, aged twenty-three. First examination October 25, 1922. She complained of loss of strength and constipation, and was extremely apprehensive about traveling alone. She had had bilious attacks from early childhood. These had ceased at about the eighteenth year, only to be followed by severe headache and vomiting. She had been constipated from childhood until the nineteenth year, at which time she had an

attack of "intestinal indigestion" followed by diarrhea. Subsequently the bowel condition became very irregular. The *x*-ray showed a severe colitis with right pericolic membranitis.

Total colectomy November 15, 1922. There was a very severe mesenteric adenitis which in the opinion of Andrew Todd McClintock, our pathologist, might easily have been mistaken for status lymphaticus. Marked dysmorphism of the bowel was found, together with serious pressure colitis. Obstructive pericolic bands over the ascending colon and the splenic flexure were present. Those on the right side were recognized as omental, in part at least. The entire bowel was removed by the older technique, that is, without mesenteric marsupialization.

This patient has had complete arrest of her symptoms, and has recently travelled through Europe alone.

Case No. 4931. Male, aged twenty-five. This patient presented a definite history of gastrointestinal disorder for fifteen years. He was referred from the Department of Health in New York City as a hopeless and helpless derelict. He has now been operated upon 9 times, twice in Antifogasta, the remaining 7 operations having been done by us. As so often happens in the surgical treatment of gastrointestinal invalids, the relatively useless operation of appendectomy was done first, to be followed shortly because of lack of improvement by attempted hemi-exclusion of the right colon. This so far as could be learned was the condition which obtained when the patient reached New York. He rapidly deteriorated and was little more than a skeleton at the time of the third operation. This was *total colectomy*, October 1922. The colon was in an advanced state of degeneration due to densely contractured pressure membranes. The hemi-excluded segment was packed with dry fecal material, an invariable sequel to a procedure which so disorganizes function. Following this the patient developed a duodenal ulcer which necessitated gastroenterostomy. In spite of the fact that all oral sepsis was carefully treated, a marginal ulcer developed upon the site of the stoma. A number of palliative surgical efforts were made to heal this without satisfactory result and it was finally resected together with a further considerable portion of the pyloric antrum. A noteworthy observation on this patient and one which we have confirmed on many occasions is that extensive adhesions rarely occur within a colectomized abdomen in spite of numerous operations. There is much reason for believing that a proportion at least of the usual postoperative adhesions originate from colonic transudations.

This patient is free from abdominal pain for the first time in sixteen years, has gained thirty pounds in weight, and is studying architecture.

Case No. 4281. Male, aged twenty-one. This patient was a drug clerk, and because of his habitual use of castor oil had become the butt of ridicule for all his fellow employees. It was a common joke in the store that his troubles were imaginary and all located in his head. One year prior to our first examination he had been sent to Fordham Hospital for the relief of a severe impaction of the bowel. It is important to note that although over twenty years old he had never progressed beyond a boy's equipment mentally. He was able to do up bundles and run errands and was paid twelve dollars a week. He was sallow, pale and nervous and had constant abdominal pain. Roentgen-ray studies showed an immense dilatation of the cecum together with persistent gastric and colonic retention. On May 8, 1916 the right colon was removed. There was a particularly heavy pericolic veil which held the ascending colon in marked angulation. When liberated the cecum came into view, presenting a mesentery of unusual length and continuous with that of the ileum. Although the condition of the patient was improved with regard to the constipation, he was still inclined to be drowsy and to suffer from the severe toxic headaches which had constituted a large part of his general disability. In May, 1919 the pelvic colon was resected. In April, 1921 the improvement in this patient's condition was reflected by his promotion in business. The disabling toxic headaches ceased. For several years he remained in a more or less stationary condition, never being quite well, until further study revealed the presence of extensive oronasal sepsis, notably in the sinuses. Following the radical treatment of these conditions he has made a complete recovery and is now a successful business man.

Case No. 3940. Male, aged forty-one. This patient, while well educated and of fine family,

had never worked and was unsuccessful in his profession. He was little given to complaining and was regarded by his friends and relatives as being mentally and morally incompetent. He had suffered since boyhood from chronic and persistent constipation. After a friendship of many years, he confided to both of us that he had always felt himself to be inferior and incompetent and that in order to face the requirements of life he had found it necessary always to resort to the use of alcohol, and more recently to narcotic drugs. It was known that he had been addicted to alcohol since before his twentieth year. He confessed that he had also become addicted to the use of cocaine and morphine, besides having experimented with every other form of narcotic drug. He found that laxatives and purgatives were absolutely inefficient unless bolstered by the relaxing effects of profound narcosis. Roentgen-ray examination of the alimentary canal disclosed one of the most typical examples of bilateral omental deviation that we have ever seen, with secondary degeneration of the entire colon (Fig. 1). The patient requested that his colon be removed, and upon being told that he was a bad risk on account of the presence of advanced myocardial changes, replied that he would be better off dead than alive unless he could be relieved of the physical distress and mental depression incident to his condition, and that he considered this directly the result of his having been unable for many years to empty the right side of his colon.

Total colectomy was performed in 1924. On opening the abdomen the posterior surface of a large mobile cecum presented, the middle of the ascending colon being so adherent to the floor of the right abdominal gutter that it could not be mobilized without section of the dense overlying fibrosed omental tissue. This had served to approximate the cecum and hepatic flexure through a longitudinal pull coupled with extreme pressure on the middle portion, and accounted for the distortion of the cecum. The cecum was packed with fecaliths harder and more compact than usually seen. The omental insertion in the ascending colon was continuous with a heavy fat-bearing band which crossed the duodenum to find attachment on the liver and gall bladder. Similar omental deviation on the left side caused constricting angulation of the transverse colon, and distortion of the splenic flexure with abnormal attachment to the spleen. This patient had megacecum, although the roentgen-ray did not disclose it because of the compression and distortion. Stormy postoperative history due in large part to enforced withdrawal of alcohol, and difficulties attendant upon the administration of morphine and cocaine in correct dosages. Surgical recovery, but followed by death on the fifteenth day, with symptoms of delirium tremens and cardiac insufficiency.

The son of this patient also has a pronounced megacecum (Fig. 3) and was observed by one of us in an attack of petit mal.

Case No. 3893. Female, aged thirty-nine. This patient was evidently born with a dysmorphic or over-sized colon. At the age of two she was seriously ill with acute bowel impaction. From her seventh year on she remembered having been frequently ill and having to lie across a chair because of pain. The condition was called "catarrh of the bowel." Until her eleventh year she had been able to attend school for less than one complete year. In spite of this chronic invalidism she entered college at seventeen and graduated in three years with Phi Beta Kappa honors. While studying for the degree of Doctor of Philosophy in the University of Pennsylvania she had frequent attacks of severe abdominal pain, often leading to hospitalization. The outstanding symptoms were frequent sore throat, otitis media, cervical adenitis, migraine relieved only by castor oil, obstinate constipation with intercurrent attacks of diarrhea, vomiting due to gastric retention and attacks of palpitation and bradycardia often associated with extrasystolic arrhythmia. The appendix was removed in 1907. In 1916 there was done in Philadelphia an ileosigmoidostomy together with resection of the ascending colon. The improvement was transient. The patient first presented herself at this office in 1921. She was evidently suffering from very grave toxemia of intestinal origin. Roentgen-ray studies disclosed dilatation of and prolonged retention in the excluded blind segment. There was also severe dental infection and chronic disease of the paranasal sinuses. These latter conditions were alleviated by surgical measures before the major abdominal procedure was undertaken. In July, 1921, the excluded segment, comprising about 2½ feet, was resected. It was more than half filled with fecal masses which were moderately soft

near the anastomosis, but became progressively harder in the transverse colon, and near the occluded end of the transverse colon felt like concretions. The anastomosis then existing, although unusually large, was not disturbed. Gradual improvement in the abdominal condition was interrupted a year later by an acute pyelitis necessitating tonsillectomy and conical enucleation of the cervix. While still convalescing, a severe recurrence of the antral infection with secondary glaucoma developed. This was accompanied by such rapid increase in intraocular tension as to require immediate and continuous drainage. This was established by iridoencleisis. The patient had been almost blind. Following the radical surgical treatment of the antra there was a gradual improvement in the symptoms so that the patient's vision is now 15/20. About six months later she developed subacute intestinal obstruction requiring laparotomy. A band was found compressing the bowel near the stoma. Thereafter the patient's improvement was slow but became more and more rapid following a minute dose of colon streptococcus antiserum which had resulted in a severe and almost fatal attack of anaphylaxis occurring on the fourth day. The patient is now, one year later, in better health than at any time since her childhood.

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CESAREAN SECTION

SOME RECENT MODIFICATIONS IN TECHNIQUE

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ONE of the notable features of obstetric practice during recent years has been an increase in the number of cesarean sections performed for other than absolute indications. Formerly this operation was utilized only as a last resort, and some obstetricians advised it only in the presence of extreme narrowing of the parturient canal. The tendency in recent years, however, has been to allow cesarean section to compete with other obstetric procedures in the management of dystocia due to causes other than extreme pelvic contraction, and also in meeting various obstetric emergencies.

Minor degrees of contracted pelvis, sufficient to delay delivery through the passages but not to make it impossible, are now recognized as relative indications for cesarean section when the interests of mother or child demand immediate cessation of labor. For the management of this type of case I believe that abdominal section is to be preferred to the use of high forceps. It is far safer for both mother and child and avoids those extensive lacerations which usually follow high forceps delivery. Having performed the operation eighty times during the past eight years, I have been much impressed with its greater safety.

Improved technique has made cesarean section a less formidable operation than formerly. I have devised a technique which, I believe, assures a cleaner operation and one less likely to be followed by infection than the so-called classical cesarean section. But, before describing my own operation, it will be of interest to review briefly some of the modifications of the cesarean operation that have been proposed during the last few years, in order that the reader may have a comprehensive idea of the situation.

THE SO-CALLED CLASSICAL OPERATION

Sänger in 1882 described an operation for cesarean section, to which we still adhere in principle, although it has been modified in details from time to time. It is therefore called the classical operation.

The patient is catheterized and a hypodermic injection of ergot given. The skin of the abdominal wall is prepared in the usual manner and ether anesthesia administered. An incision about 5 inches long is made in the linea alba, its upper end reaching almost to and a little to the left of the umbilicus. The initial incision should be small. It is completed by cutting the remainder with scissors guided by two fingers inserted into the peritoneal cavity. The uterus is carried to the median line and steadied there by an assistant. Gauze is packed around the fundus so as to prevent peritoneal contamination when the uterus is opened. Grasping the uterus with a volsella, the assistant holds it up against the abdominal wound. A longitudinal incision 5 inches long is made half through the uterine wall; then, with lessening strokes, the incision is completed so as to open the uterus. Using the scissors and two fingers, the operator enlarges the opening to the full length of the original incision. In this procedure he punctures the gestation sac, allowing the contents to spill. As the amniotic fluid gushes out, he searches for one foot and then makes a breech extraction with the Smellie-Veit maneuver on the after-coming head. The assistant presses against the sides of the abdomen in an effort to keep the fluid and blood from welling into the peritoneal

cavity; but it is, of course, impossible to avoid the leakage of a considerable amount of the liquid into the abdominal opening.

In the meantime, 1 c.c. of pituitrin is injected intramuscularly. The umbilical cord is clamped and cut as after normal delivery, and the infant is then handed to a second assistant. Usually the placenta drops into the uterine cavity, whence it may be removed manually; but care must be taken to pull gently in order to remove all the membranes. The uterine cavity is stuffed with a gauze pad, which is removed just before finishing the first row of sutures.

Beginning at the upper angle of the wound, the first row of stitches is inserted just beneath the endometrium, which must not be inverted into the wound. The second row is taken in the thickness of the muscle. Then the catgut ends are tied so as to leave one knot for the double row of sutures at each end of the uterine wound. The third row of uterine sutures begins at the lower end of the uterine incision; reaching the top, it turns back on itself, to come down along the peritoneal surface of the uterus and be tied as a second knot at the lower end. The knots must be tied firmly and accurate coaptation of the uterine wall is essential. It is sometimes advisable to add a row of interrupted sutures where apposition is difficult. Each row of uterine sutures buries the preceding row. The abdominal wound is closed as after ordinary laparotomy.

SOME RECENT TECHNICAL DEVELOPMENTS

So many modifications of the cesarean operation have been described that it would far exceed the scope of this paper to give credit to them all, but enough of the methods described in the last few years will be mentioned to give the reader a clear conception of the trend of modern technique in the performance of this operation.

The usual anesthetic, of course, is ether. Even in Europe, many operators are showing a tendency to abandon chloroform as being too dangerous. Nitrous oxide has proved unserviceable for this operation, because it fails to give the required relaxation and increases bleeding.

In patients classed as bad surgical risks, such as those with decompensated heart disease, tuberculosis, diabetes or nephritis, Irving[1] has recommended the performance of cesarean section under morphine and scopolamine combined with local anesthesia. This form of anesthesia helps to reduce the shock of operation to a minimum.

Astley[2] regards spinal anesthesia as the method of choice in cases of eclampsia, stormy nephritis, severe toxemia, pneumonia and other menacing conditions associated with a degree of dystocia that requires the performance of the cesarian section. Intraspinal anesthesia reinforces contraction and retraction of the uterus and has the advantage of almost total absence of hemorrhage and good postoperative recovery. However, one must expect an occasional death from the anesthetic. In Brindeau's[3] series of 232 cases there were 2 deaths from this source.

DeLee[4] favors the low, or cervical approach, an operation which he calls laparotrachelotomy. With this technique he had but 2 deaths in 330 operations. The operation is simplified, particularly if the patient has been in labor for a long time, by the fact that uterine contraction stretches the lower uterine segment and draws the cervix away from the bladder. The fascial incision is made 1.5 cm. to the left of the linea alba; then the rectus muscle is drawn from its sheath at the midline and the peritoneum opened extramedially. By this means the rectus muscle is mortised into the fascia when the wound is closed, serving to prevent subsequent hernia. The bladder, which is usually high on the abdominal wall, is pushed down and to the right. After dissection of the overlying peritoneum, the incision is made in the lower uterine segment. The face of the child is brought to the opening by means of a finger inserted into its mouth, and the infant is delivered chin first. The placenta may be removed manually or by Credé's

method. The uterine cavity is packed lightly with a strip of gauze and the wound in the lower segment closed by means of buried layers of sutures.

In performing transperitoneal cesarean section, Polak[5] makes a low abdominal incision. A traction suture is placed in the uterus at the upper limit of the abdominal incision, which, when held taut, occludes the wound perfectly. A peritoneal flap including the bladder is separated. The infant is delivered head first and the placenta allowed to separate spontaneously. To stimulate its contraction and retraction, the uterus is packed with washed iodoform gauze, which will usually be found extruded into the vagina at the end of twenty-four hours. The uterine wound is completely occluded by suture of the bladder reflexion over it, thus preventing the possibility of peritoneal leakage and intestinal adhesions.

Hirst[6] believes that no single operation is applicable to all cases in which cesarean section is employed. He advocates as many as five separate procedures, each of which may be used to best advantage under appropriate conditions. Hirst believes that the old classical operation with a long incision and eventration of the uterus, while easy to perform, is rarely indicated except when extraordinary exposure of the uterus and abdomen is required, as in central placenta previa, where immediate control of hemorrhage is essential. The short high incision with emptying of the uterus in situ and then eventration for purposes of suturing is best for the case definitely known to be clean and uncontaminated. Extraperitoneal cesarean section or low cervical cesarean is called for when previous contamination has occurred but there is not frank infection. The Porro operation, that is, abdominal hysterectomy with dropped stump, should be used when there are indications for hysterectomy, such as fibroid degeneration of the uterus. Abdominal hysterectomy with marsupialization of the stump in the abdominal wall and extraperitoneal drainage is indicated in cases which have been neglected in long labor and in which there is great likelihood of infection.

The purpose of the operation described by Brodhead et al.[7] is to secure a quadrilateral area on the anterior surface of the uterus, through which the infant may be extracted, and at the same time to have this area excluded from the general peritoneal cavity. In order to secure this quadrilateral area, which measures 6 inches in length and ¾ inch in width, they suture the peritoneum of the anterior abdominal wall to that of the anterior surface of the uterus. Fully recognizing the dangers of the initial spill when the gestation sac is opened, Brodhead goes to elaborate pains to prevent the entrance of the fluid into the peritoneal cavity. As I shall show later on, the simple maneuver that I employ completely averts this danger.

Henkel[8] operates through a median abdominal incision, slitting the vesical peritoneum transversely and pushing the bladder and peritoneum downward as far as possible. The lower uterine segment is opened up by an incision through the middle of the cervix. The moment the cord is tied the suturing of the uterine incision is begun, working upward. When the suturing has been half completed, the placenta is separated by Credé expression from without and drawn out through the upper half of the wound. The incision is closed with button sutures 1 cm. apart, which do not pass through the mucosa. A running catgut suture is used for the serosa. When suturing the layers of the uterus, one must be careful not to allow any of the mucosa to catch between the muscular surfaces, and each layer must be coapted separately. Henkel has had such good results with this technique that he has greatly extended the indications for the cesarean section.

Rosenfeld[9] believes that drainage should be instituted in connection with cesarean section. He is of the opinion that peritonitis, when it does occur, is due not to the initial spill but to pathogenic organisms which invade the uterus about the fifth

day and migrate through the uterine suture lines to reach the peritoneum. He places a cigarette drain directly over the wound on the uterus, allowing it to emerge through the lower angle of the abdominal incision. This drain is held in position by looping a few interrupted plain catgut No. 0 sutures around it, the sutures passing through the subjacent anterior uterine wall. The catgut is absorbed in from twenty-four to forty-eight hours. Should it become necessary to remove the drain, there are no sutures after twenty-four hours to hinder its removal.

Von Reding[10] does not suture the uterus after cesarean section except in clean cases. He believes that to suture a uterus known to be infected is contrary to general surgical principles and can see no essential disadvantages in leaving the wound open. In order to assure drainage in cases known to be infected, von Reding uses several stout catgut loops tied through the edges of the wound on each side so as to hold the lips of the incision slightly apart.

As cesarean section is frequently performed nowadays in cases in which infection is not a serious factor, and hysterectomy is probably preferable in the presence of grave contamination, there does not seem to be much call for the procedure advised by von Reding.

A two-stage operation with an interval of twenty to thirty days between the stages is performed by Portes.[11] He modifies extraperitoneal cesarean section to the extent of leaving the uterus temporarily outside the abdominal wall after the infant has been removed. His immediate results in 10 cases were excellent. Portes believes that this method is indicated when it is too late for conservative cesarean section and either hysterectomy or cephalotripsy would otherwise be inevitable.

In performing the Porro operation, Proubasta[12] severs the vascular pedicles of the uterus, thus allowing more thorough packing with gauze to protect the peritoneum. In order to reduce shock as much as possible, he partly sutures the abdominal incision as soon as the uterus is drawn out of the wound, without waiting until hysterectomy has been performed.

AUTHOR'S TECHNIQUE

The aim of my operation is to avoid contamination of the peritoneal cavity and the uterine incision by the spill of fluid occurring when the bag of waters is ruptured within the uterus. To this end I have adopted the practice of delivering the infant within the gestation sac, avoiding rupture until it has been removed entirely from the operative field. This maneuver, I believe, removes one of the most serious dangers of the cesarean operation, namely, peritoneal contamination from the spill of fluid from the uterus. I am convinced that its greater safety will considerably increase the scope of usefulness of cesarean section.

The uterus is delivered through the abdominal wound by a rectus incision slightly to the left of the median line. The intestines and abdominal cavity are then walled off with saline gauze. The uterus is opened by an incision beginning at the bladder and extending sufficiently high for easy delivery. We feel that a low incision makes a more secure scar, but there is no advantage to making it longer than necessary.

Instead of rupturing the amniotic sac, I carefully strip the entire gestation sac from the uterine wall and deliver it en masse. So long as the placental circulation is maintained, there is no danger to the child from this procedure. This maneuver requires about one minute, although I believe five minutes would be perfectly safe. The sac containing the infant is handed to an assistant, who removes it from the vicinity of the wound, ruptures the membranes, extracts the child, and ties and severs the cord.

It might seem offhand that it would be difficult to separate the gestation sac from the uterine wall, but I have not found this to be the case. In eight consecutive cesarean sections performed according to

this technique without a death to mother or child, I have encountered no difficulty in effecting this separation.

Occasionally the placenta will be found lying beneath the uterine incision. I do not believe that this finding need occasion concern. In fact I search for it before incising, by means of palpation and stethoscope. There is less danger of rupturing the sac if the separation is begun with the placenta.

After delivering the upper portion, the assistant makes pressure on both sides of the uterus from below, expressing the gestation mass.

The uterine incision is sutured with buried layers of stitches in the usual manner. The abdominal wound is then closed without drainage.

It has been my experience that this operation is cleaner and more in accord with surgical principles than the ordinary procedures, and that it reduces the hazard of infection to a minimum. Because of its greater safety both for mother and child, I believe that this improved cesarean section should be given preference to the use of high forceps in the majority of instances, since it prevents the extensive lacerations of the birth canal usually following instrumental delivery and also avoids compression of the infant's skull.

SUMMARY

Recent improvements in the technique of cesarean section are greatly increasing the scope of this operation. Formerly used only as a last resort, it is now competing successfully with many other standard obstetric procedures. I believe that, in most instances, a modified cesarean section is safer for both mother and child than the use of high forceps. For the mother, it avoids the extensive lacerations of the birth canal usually incidental to instrumental delivery, and for the child, the dangers of compression of the skull.

An improved technique for cesarean section is described. The principal point of this operation is the delivery of the entire gestation mass, containing the infant, intact, and the opening of the sac away from the field of operation. By this measure peritoneal contamination from the spill of fluid is prevented. I have found that the separation of the gestation sac from the uterine wall offers but slight difficulty. In the eight successive cesarean sections in which this technique was employed, there were no deaths to mother or child.

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SURGICAL CLINICS
JACKSON CLINIC, MADISON, WISCONSIN

CLINIC OF DR. REGINALD E. JACKSON

MADISON, WISCONSIN

INTERSCAPULOTHORACIC AMPUTATION FOR RECURRENT CHONDROMA

THE following is a rather detailed history of this case from the records. In a letter received from the patient a few days ago he says: "I am still above ground, am feeling perfectly well, only my shoulder, and I guess you know what the trouble is. You have kept me going for the last nineteen years."

I first saw this patient on March 10, 1902, when he was twenty-five years of age. His chief complaint was a large, hard tumor springing from the upper portion of the shaft of the right humerus (Fig. 1). This was first noticed three years previously and was without history of trauma. A gradual, steady increase in size was noted. A diagnosis was made of sarcoma and immediate amputation advised.

The patient then consulted Dr. J. B. Murphy and Dr. A. J. Ochsner, who gave him the same advice. Dr. B. Sippy suggested that biopsy be done before resorting to amputation. This was performed and acting on the report of Prof. W. S. Miller, of the University of Wisconsin, who stated that the growth was a pure hyaline chondroma, I removed the tumor mass.

Six months later several small nodules were noted in the operative area and were removed (Fig. 2). Again the pathological report was pure hyaline chondroma. Six months after this it was necessary to remove several more nodules.

I did not see this man again until August 13, 1906. He then presented a large tumor involving the entire operative area and extending into the axilla (Fig. 3). The size of the growth had increased rapidly during the preceding month and it was decided to do interscapulothoracic amputation.

Under ether anesthesia the middle third of the clavicle was first resected with a chain saw and the subclavian artery ligated in two places with No. 2 plain catgut, and divided. The arm was elevated to allow the venous blood to empty; the subclavian veins were then doubly ligated and divided. The nerves of the brachial plexus were injected with 2 per cent cocaine solution before division, and operation was completed according to the Berger method (Fig. 4). When the patient was removed from the operating room he presented some symptoms of shock which were quickly dispelled by an intravenous injection of 2000 c.c. of sodium chloride solution. Convalescence was rapid and uneventful and the patient was out of bed on the fourth day.

The pathological reports made on sections taken from various parts of the tumor mass were invariably the same: pure hyaline chondroma. Evidence of sarcoma was not found.

One year after amputation of the arm the patient returned presenting a single subcutaneous nodule 1 by 1 cm. in about the middle of the scar. This nodule was removed under local anesthesia. For thirteen years, from August, 1907, to June, 1920, the patient enjoyed perfect health and was free from any evidence of the disease. Figure 5 is his photograph taken twelve years after amputation.

In June, 1920, the patient reported that he had recently noticed a nodular swelling rather deep in the region of the scar on the shoulder. Under general anesthesia a semicystic tumor, 5 by 7 cm., was removed. The tumor was firmly attached to the first rib, so that it was necessary to resect the rib and the remaining end of the clavicle in order to remove the growth. The coincident traumatic pneumothorax was well borne by the patient. The pathological report on this specimen from Dr. C. H. Bunting, of the University of Wisconsin, reads:

"Section shows an invasive growth into muscle and adipose tissue of irregular masses of atypical cartilage cells with poorly formed matrix. The typical appearance of actively growing chondrosarcoma, that is, polymorphous and spindle cells, were not seen. Malignancy evidently low."

On February 17, 1921, the patient again came to me for examination and two nodules each about 2 by 3 cm. were found apparently attached to the third rib. Roentgenologic examination failed to reveal any signs of metastasis. Under ether anesthesia, wide excision of all involved tissue was performed, including resection of the second and third ribs. Every effort was made not to leave any fragments or chips of the nodule in the wound. Bunting's pathological report was:

"Section of tissue shows a chondroma which is rather atypical and which I should expect to recur, although it does not show typical sarcomatous change."

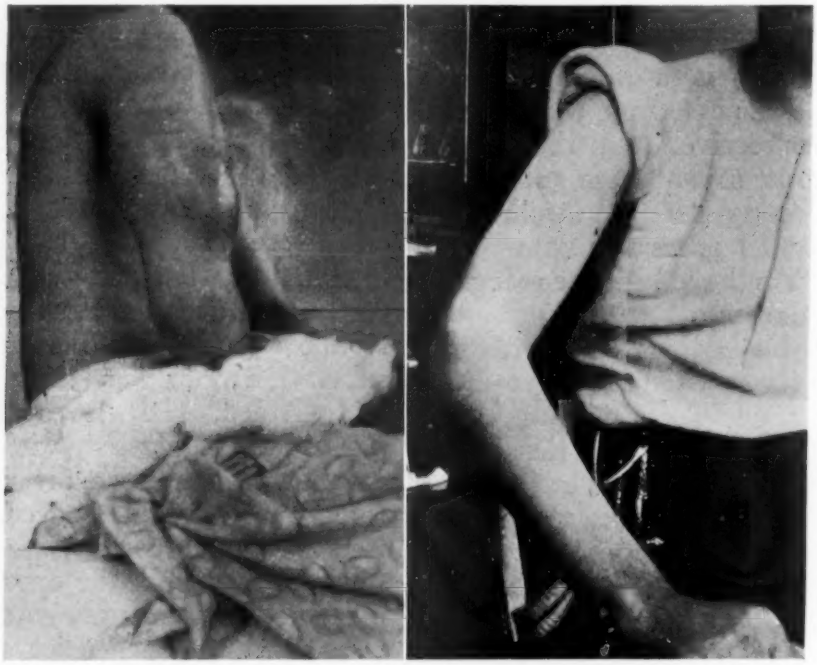

Fig. 1. Fig. 2.

Fig. 1. March, 1902. Large, hard tumor at the upper portion of the shaft of the right humerus. Biopsy revealed the growth to be pure hyaline chondroma.

Fig. 2. September, 1902. Six months after the removal of the growth several small nodules were noted in the operative area.

The gross appearace of this last specimen differed somewhat from that of those removed at previous operations in that in places the consistency of the mass varied from pure hyaline to semigelatinous material.

On June 8, examination of the patient revealed a palpable swelling about 3 by 5 cm. on the posterior aspect of the upper thoracic wall. At operation the mass was found to be in the muscle tissue and was not attached to, or connected with, the ribs. Dr. Bunting's pathological report was:

Section of tissue shows several large (microsopically large) masses of irregularly formed cartilage with atypical cells. From these larger masses there are numerous projecting tongues of similar cells invading the voluntary muscle and adipose tissue. Several islands of similar character are found at quite a distance from the larger masses. Hence, an invasive atypical cartilaginous growth, a chondrosacroma which from the microscopic picture, one would say was of relatively low virulence, even without the history.

tumor was an enchondroma, but I do not know any enchondroma that occurs in the soft tissues as he reports that some of the later tumors have been.

The question now appears to be whether he shall have further surgery or roentgen-ray treatment. To satisfy myself as to that I have just had him examined by Dr. William Allen Pusey. Neither he nor his partner, Dr. Senear, have any idea concerning the pathologic condition. They agree that further operation

Fig. 3. Fig. 4. Fig. 5.

Fig. 3. August, 1906. A large tumor which had developed involved the entire operative area and extended into the axilla.

Fig. 4. Patient after Berger amputation.

Fig. 5. Photograph of patient twelve years after amputation of arm. He enjoyed perfect health for a period of thirteen years.

On receipt of this report the still fresh operative wound was reopened and 100 mg. of radium element was placed in situ. The position of the radium was changed every six hours until 2150 mg.-hours had been given, followed later in convalescence by thorough roentgen-ray irradiation of the entire area of amputation.

On October 31, the patient's home physician stated in a letter that two more growths had appeared and that the patient was greatly discouraged. On November 22, Dr. John Ridlon of Chicago, whom the patient had consulted, wrote me as follows:

I examined Mr. C. B. last night. From his story I have no idea of the pathology of the tumors. He reports that you found the first

seems useless and it is their opinion that roentgen-ray treatment may ultimately result in a cure of these tumors.

The patient was given another prolonged and intensive series of roentgen-ray treatments. As the size of the growth continued to increase, he became discouraged and he stopped treatment several months ago. For the past six weeks he has suffered intensely with neuralgic pains in the right side of the neck and he came here again seeking relief.

We found no evidence of cachexia. The patient was well nourished, and his physical development was excellent except for this one affliction. The roentgenologist found an extensive local recurrence encroaching

on the right posterior upper thoracic cavity (Fig. 6). On palpation an extensive multinodular mass was felt extending from the most prominent part of the scar of the amputation into the cervical region, where it assumed a more singular outline and was semicystic in consistency. Pressure on it markedly increased the painful sensations which the patient complained were constantly present. The growth was evidently

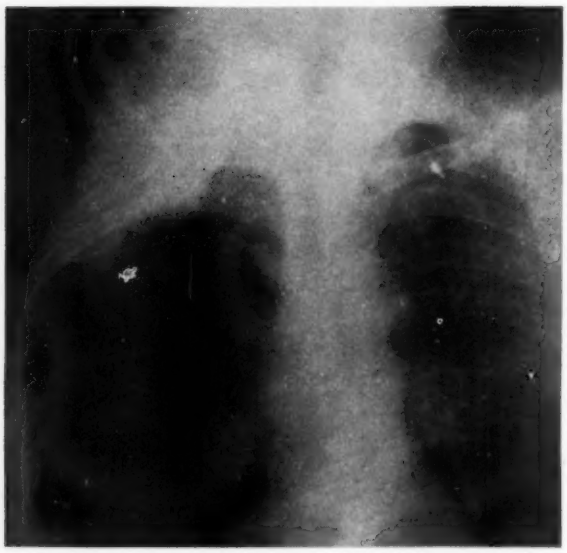

FIG. 6. At last examination the roentgenogram showed extensive recurrence of the chondroma in the right, upper, posterior thoracic cavity.

attached to and encroaching on the stumps of the cervical plexus.

The incision exposed the most prominent cervical mass, which was seen to have a rather dense fibrous capsule. On incising this (it was useless to attempt to extirpate it) the contents, which were apparently under pressure, gushed out in the form of a semigelatinous, granular substance the color of light currant jelly. By extending the incision into the lateral cervical regions I exposed branches of the cervical plexus which were attached to the capsule of the tumor. After injecting them with novocaine and absolute alcohol and dividing them, I felt that I had done everything possible to alleviate this man's suffering.

An additional interesting feature of this case is the fact that the patient belongs to a "tumor family." During the nineteen years since I first saw him I have operated on seven other members of the family for the following conditions: father for adenoma of the prostate; one brother for chondroma of the finger; one sister, splenectomy for splenomyelogenous leucemia; one sister for adenomyoma of the uterus, and three sisters for fibromyoma of the uterus.

In connection with this case the question

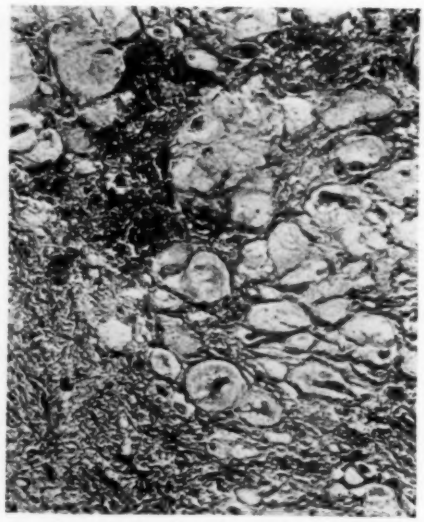

FIG. 7. Section of tumor removed at the time of last operative interference.

has often arisen in my mind whether it would have been better to have amputated the arm in the first place; and yet, had I done this the pathological report of a pure hyaline chondroma would have given me an uneasy conscience. The interval of thirteen years during which the patient was apparently entirely free from the disease is an extremely interesting factor.

Dr. Bunting has kindly consented to discuss this case from the standpoint of the pathologist:

I can speak only of the character of the recurrences as the original tumor did not come under my observation. The recurrent tumors, however, show several noteworthy points. In the first place the tumor is made up of cartilage cells of a mature type separated by a hyaline matrix often poorly formed. While the cells are usually found singly and surrounded by a capsule of more recently formed intercellular

matrix, they may be found in pairs, as in normal cartilage. No typical groups of four cells were found. The cells vary considerably in size and in some the nuclei attain the size of giant-cell nuclei. At no place in the sections does one find the de-differentiaton into closely packed spindle or polymorphous cells so characteristic of the rapidly growing chondrosarcoma.

In its general mode of growth the recurrences differ from benign chondroma. There is no continuous cartilage mass as in a chondroma, but instead, small groups, islands, or strands of a few cartilage cells and their matrix, surrounded by a connective tissue stroma. In other words the tumor has a distinctly alveolar architecture. The invasive columns of cells at the edge of the growth suggest strongly the growing edge of a squamous celled epithelioma.

One has then in the tumor an alveolar chondrosarcoma with mature type of cell and with a marked tendency to invasive growth. The clinical history would indicate that no general metastatic growth had taken place, a feature probably dependent upon the marked tendency of the cells to secrete the cartilage matrix which has thus bound them together (Fig. 7).

OMENTAL CYST

This patient, a man aged fifty, a painter, registered at the Clinic stating that for the preceding five months he had had loss of strength associated with increasing sense of discomfort with bloating in the lower portion of the abdomen. For a while the bowels had been loose, but were then normal. At times he still had pain in the region of the bladder on urination. There was no increase in frequency or hematuria. Appetite and digestion were good, and there was slight if any loss of weight. There was no history of abdominal trauma.

Four years ago the patient came to the Clinic complaining of cramping pains in the lower portion of the abdomen. The illness began six weeks previously with an early morning attack of lower abdominal pain associated with constipation, nausea, and occasional vomiting. The pain was eased somewhat after the fourth day when the obstipation was relieved. The patient was in bed for four weeks on the advice of his physician who diagnosed the attack as partial intestinal obstruction due possibly to malignant disease in the colon. The patient still had more or less constant slight pain in the lower portion of the abdomen; the bowels moved three or four times a day. There was no blood or mucus in the stools, and no tenesmus. Roentgenograms at this time failed to show any suspicious filling defect in the colon. Proctoscopic examination was negative. Two months later the patient was entirely free from symptoms.

On examination the patient was sallow. He weighed 140 pounds. The temperature was 98.5°F., pulse rate 84, systolic blood pressure 160, and diastolic 90. There was a simple uniform enlargement of the lower half of the abdomen which extended to a point midway between the umbilicus and ensiform cartilage. On palpation and percussion the mass was unquestionably a collection of fluid in a confining membrane. The entire area of the swelling was dull to percussion with no evidence of intestinal coils intervening between the cystic swelling and the overlying anterior abdominal wall.

The testicles were normal. Rectal examination revealed prostatic enlargement, Grade 1. No residual urine was passed through the catheter; the mass remained as before. Cystoscopic examination revealed the capacity of the bladder as normal. A well-defined prostatic bar was present with a generalized intravesical prostatic enlargement. It was not possible to catheterize the ureters to obtain pyelograms.

Urinalysis showed specific gravity 1.012, neutral reaction, trace of albumin, and no sugar. The return of the combined intravenous phenolsulphonphthalein test was 60 per cent.

Blood examination showed 80 per cent hemoglobin, 4,420,000 erythrocytes, and 9850 leucocytes. The Wassermann reaction was negative.

This case presented a large cystic tumor of the lower half of the abdomen without any very pronounced clinical symptoms

which would permit a positive diagnosis although the most probable lesions suggested are omental or mesenteric cyst or cyst of the urachus. Exploratory laparotomy was indicated.

Operation. Nitrous oxide and ether anesthetic was used. An 8-inch right paramedian suprapubic rectus incision was made. On opening the peritoneum I found immediately beneath it, and slightly

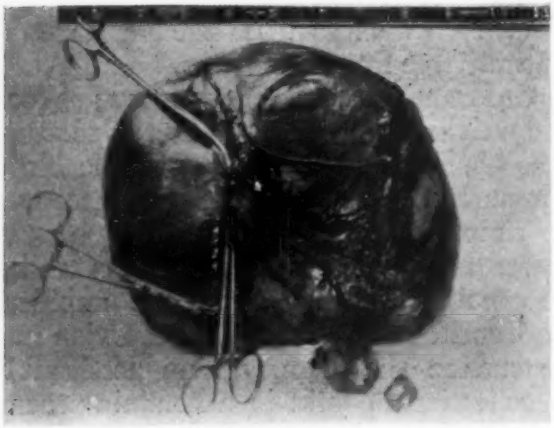

Fig. 8. Sac partially filled, showing its origin from omentum.

adherent to it, the bulging cyst wall. This was exceedingly thin in places and through it could be seen the dark amber-colored fluid contents. A trocar and cannula were introduced and 2000 c.c. of dark amber, slightly turbid odorless fluid were withdrawn and the trocar opening closed with a clamp leaving about 1000 c.c. of fluid in the sac which was unilocular (Fig. 8).

By gentle use of the finger, covered with gauze, the sac was readily freed from the slight adhesions to the anterior parietal peritoneum. At its pelvic end this sac was so firmly adherent to the dome of the bladder that it was necessary to use scissor dissection. It was also necessary to use some traction and more forcible action of the gauze-covered finger to free the posterior wall of the sac from its adhesions to the posterior parietal peritoneum, especially in the pelvis and along both flanks. The entire sac was now outside the abdominal cavity, but was still suspended from its cephalad surface by a markedly vascular membrane about 10 cm. broad. It unquestionably was the great omentum, that portion of it which hangs below the transverse colon. There was scarcely room to clamp and divide this structure, so closely did the colon approximate the cystic sac. We noted that there was no connection whatever between the umbilicus and the sac nor was there any evidence that this cyst had its source of origin in any retroperitoneal structure or vestigeal remnant. The omentum was clearly the only possible source of origin. The stomach, liver, gall bladder, spleen, and both kidneys seemed normal on palpation. The appendix was in a state of fibrous obliteration.

We placed the patient in the Trendelenburg position in order to inspect, and if necessary peritonealize, any raw surface. Just below the prominence of the sacrum my hand encountered a globular cystic mass about 3 cm. in diameter, quite firmly attached to the posterior parietal peritoneum. It was necessary to use scissor dissection to remove it. Its contents were more translucent and lighter in color than was noted in the large cyst, and the sac wall was not so well organized. At the very bottom of the pelvic cavity in the median line was another cystic mass about three times as large as the previous one. It was necessary to free it with the scissors. Both of these secondary cysts might have been in direct contact with the pelvic portion of the sac wall of the large cyst, as this sac wall looked rough and abraded.

Discussion. Dowd and Farrar in 1911 tabulated the cases of omental cyst reported in the literature (37) and reported 1 of their own. Ryan, reporting a case of cyst of the omentum in 1926, stated that since 1852 when Gairdner reported a necropsy specimen before the Pathological Society of London, only 44 cases have been reported in the literature. As a rule there are no characteristic clinical symptoms except the presence of the cystic mass. When this is of some size there are the

associated symptoms of a sense of weight and bloating, possibly with dyspnea on exertion. The presence of these symptoms in a man, if the possibilities of a greatly distended urinary bladder are eliminated, should suggest the probability of an omental or mesenteric cyst and lead to exploratory laparotomy.

Dr. C. H. Bunting's *report on the pathology of the specimen.* The specimen as received consists of four separate cystic bodies. The largest of these has been evacuated of its content which is a thin fluid with a slight chocolate color. The collapsed cyst is circular, 15.5 cm. in diameter. The next cystic body consists apparently of a collection of small cysts, the largest of which is oval, measuring 4 cm. by 2.5 cm. by 1 cm. This joins a similar oval cyst also 4 cm. long by 1 cm. in its other diameters. At the junction of these two cysts there is a third smaller cyst roughly 1 cm. in diameter. The third cyst is nearly spherical and is 2 cm. in diameter. The fourth specimen is a somewhat conical cyst measuring 1.8 cm. in width, 2.3 cm. in length, and 1.5 cm. in thickness. The largest cyst has evidently been removed from the omentum, tags of which extend partly around its circumference. There lead from this groups of large blood vessels which run around the cyst dividing it into quadrants. The surface of the cyst between these vessels is glistening and smooth. The wall of the cyst is opaque in its major portion. On incision the wall is found to vary in thickness from less than 1 mm. to about 3 mm. at its thickest part. These thickened areas are evidently fibrous and are stiff and unyielding. The inner surface of the cyst is not uniform. In general it is smooth and glistening but this inner membrane appears to be spread over thick branching trabeculae suggesting the appearance of the inner surface of the bladder with the muscular bundles showing through. On other parts of the inner surface one finds definite tags of fibrin and even false membranes of considerable extent which are but slightly adherent and can be lifted off from the underlying surface. This gives a roughened appearance to this part of the cyst wall. This area is also somewhat nodular and pigmented with a light brownish pigment. The other three cysts show points of attachment apparently to omental tissue. Small blood vessels and accompanying fibrous tissue run over their outer surface as in the case of the largest cyst. The walls of the cysts are extremely thin, almost transparent. The cystic content is fluid and colorless. The inner cyst surfaces are smooth and glistening. They appear to be free from pigment and fibrinous tags are not apparent.

Fig. 9. Cross section of sac wall (× 25).

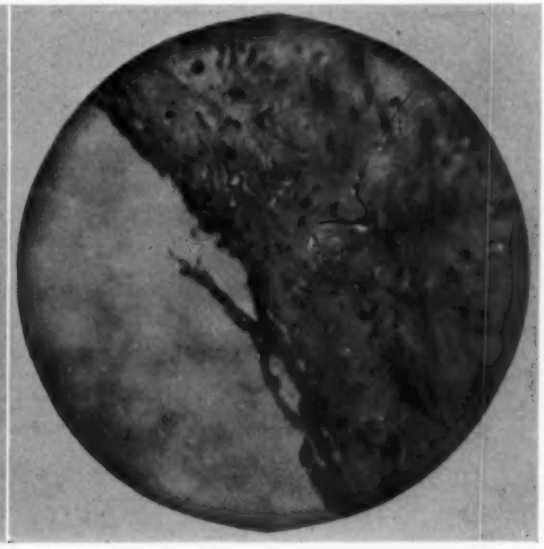

Fig. 10. Cross section of sac wall (× 175).

The cysts were fixed in 4 per cent formaldehyde. Sections for histological study were cut from various parts of the large cysts and from one of the smaller cysts. On microscopical examination the general pattern of structure of the cyst walls was found to be quite uniform (Fig. 9), but there were many variations in details in different sections (Fig. 10). In general

the cysts showed a richly vascular, rather loosely constructed outer part of the wall consisting of cellular and fibrillar connective tissue in which adipose tissue cells were in some places included. Lymphocytic vessels were numerous in this part of the wall as well as blood vessels. The inner part of the wall in general appeared to be of a much denser type of connective tissue with unusual swelling of the collagenous matrix until both grossly and histologically it resembled somewhat a carhyalin masses and fibroblastic organization was taking place. There was evidence below this fibrin layer that repeated organization of the exudate had occurred and that surface cells had been included and had multiplied within the spaces of the collagenous organizing tissue. These included cells in some places formed sheets of three or four continuous cells extending between the collagenous fibers. In other places there were masses of these cells, some with single nucleus and others with

Fig. 11. Masses of fibrin on inner surface (× 175).

Fig. 12. Lymphoid infiltration, outer portion of cyst wall (× 175).

tilaginous matrix except that it stained with eosin rather than with hematoxylin. Where there was no fibrin on the inner surface of the cyst wall, the cyst was found to be lined with relatively large cells, with vesicular nuclei and with rather deeply eosin-staining protoplasm. In no places were these cells stretched out into thin flattened plates suggesting an endothelium. Instead they were commonly rounded, bulging toward the cyst cavity, or showed marked bulges over the nucleus. When desquamated they were in general of an oval shape with centrally placed nucleus. There was, however, much variation in size of cell and in nuclear character. Some of the cells were decidedly of the giant-cell type with irregular, lobed nuclei. In sections from certain portions these cells were found lying upon a dense fibrinous lamella. They were also surrounded by fibrin strands. Fibrin also lay to the inner side of these cells in some places (Fig. 11). In some places this fibrin had fused into dense multiple nuclei in the individual cell bodies. In the smaller cyst this inner fibrinous exudate was in some places associated with an invasion by lymphoid cells and by a few polymorphonuclear leucocytes. In the outer part of the cyst walls beside a more normal fibroblastic growth there was marked infiltration of lymphoid cells about the blood vessels and chiefly about the veins (Fig. 12). In some sections there was fibrinous exudate on both sides of the cyst wall and a process smilar to that described for the inner surface was beginning to take place. Certain spaces in the outer part of the wall were lined by cells similar to those lining the inner surface of the cyst but in the main showing not so great deviation from the normal picture of the peritoneal mesothelium (Figs. 13 and 14). The endothelium of lymphatics and blood vessels appeared normal throughout. Phagocytes containing red blood cells and pigment granules were found in small groups in both inner and outer parts of cyst walls.

Comment. The general character of the lesion suggests low-grade inflammatory origin resulting possibly in inclusions of peritoneal mesothelial cells which have assumed more or less of a neoplastic character resulting in extensive growth of the main cyst but without direct neoplastic invasion of the surrounding tissue. The invasion found is apparently the result of inclusion within the continuously organizing inflammatory fibrinous exudate rather than a true progressing invasive growth. The normal state of the lymphatics of the part in addition to the general character of their lining cells appears to lend no evidence to the theory that these cysts are of lymphatic origin.

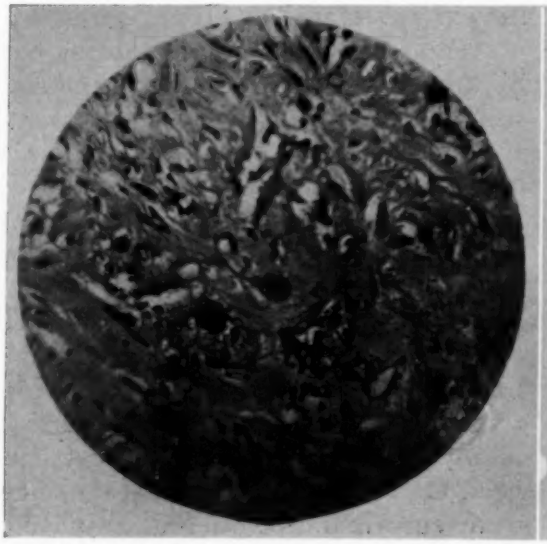

Fig. 13. Inclusion of peritoneal mesothelial cells in dense inner part of cyst wall (× 175).

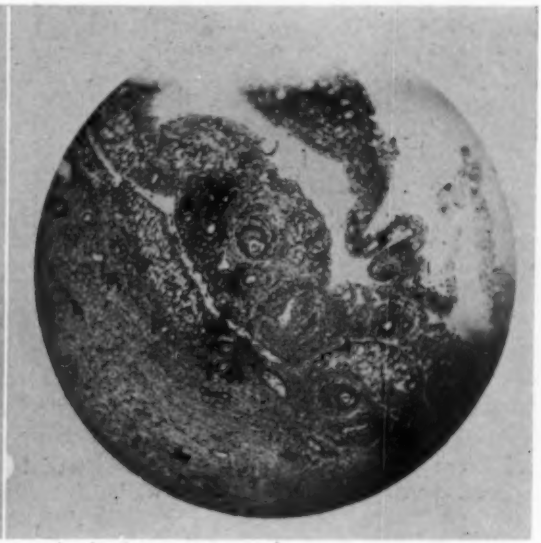

Fig. 14. Peritoneal inclusion, outer wall of cyst (× 25)

LARGE CHOCOLATE CYST WITH CONGENITAL ATRESIA OF VAGINA IN A GIRL AGED FOURTEEN

This patient came to the Clinic on October 4, 1927, with the following history: Approximately every six weeks for the past year she had had attacks of severe lower backache accompanied by lower abdominal and pelvic pain; at times they were dull and again they were so severe as to require morphine; the attacks usually lasted for from three to seven days. There was occasional vomiting during attacks and the temperature rose to 103°F. For three months during the previous summer she had been free from attacks; at the time of registration she was just recovering from the last attack. There were no urinary complaints; the bowels were regular. Menstruation had not started. Physical examination revealed nothing unusual except for the presence of a tense cystic mass which filled the pelvis. This was detected by rectal examination; the hymen was intact. Diagnosis was made of ovarian cystoma, probably dermoid, and operation was advised.

Operation was done on October 6, by suprapubic median incision. On opening the peritoneum a large, black, cystic, pelvic mass was seen through the transparent layer of the great omentum which was quite firmly adherent to it. On first examination it was thought to be a strangulated ovarian cystoma. After freeing the omentum the mass was lifted out of the pelvis and found to be a typical huge chocolate cyst of the left ovary, 8 by 15 cm., which completely filled the left side of the pelvis, and then curved over the fundus of the uterus. A left salpingo-oophorectomy was done. The operating record states that the right ovary was about twice the normal size, and was covered with a layer of cells which

obscured its usual surface markings. The uterine fundus and right fallopian tube seemed normal. No other deposits of endometrial tissue on the peritoneum were noted. Convalescence was uneventful, and the patient left the hospital at the end of two weeks.

On November 15, four weeks after leaving hospital, the child was readmitted. She had felt well and had gained 5 pounds. At

Fig. 15. Lower third of scar elevated due to endometrial graft development in abdominal wall.

3 A.M. on the day previous to readmission the child called her mother and stated that she was having an unusually severe attack of pain similar to those she had had before. The family physician was called and he administered morphine. He made a rectal examination and found a tense fluctuating mass that filled the lower portion of the pelvis. The patient at that time drew attention to the presence in the scar of the recent operation of a hard tender lump. The scar of the former operation presented an unusual condition (Fig. 15). The lower third of the scar was dome shaped and on the crest of this swelling the scar tissue was thinned out and transparent over an area of 1 by 3 cm., revealing a dark, almost black substance under tension below the thinned-out scar tissue. On palpation an indurated area was noted as occupying the dome-shaped elevation in the scar, an area about 7 by 4 cm. This was undoubtedly an endometrial graft development in the abdominal wall due to the implantation of cells from the chocolate cyst during the operation for its removal about six weeks previously.

A tense semicystic mass was found in the pelvis on rectal examination.

At the suggestion of my colleague, Dr. C. S. Harper, before proceeding to perform laparotomy, we examined more carefully under general anesthesia the condition of the vagina. There was an extremely dense imperforate hymen and it would be necessary to perforate it. There seemed to be no vaginal cavity, the hymen being backed by areolar tissue into which by block dissection I inserted my finger a distance of an inch or more. We packed this with iodoform gauze and proceeded with the laparotomy. To excise the scar I made an elliptical incision to include the indurated mass. This was filled with tarry fluid and clots, which came from a smoothly lined cavity, about 3 by 6 cm. surrounded by a bacon-like wall of induration involving the rectus muscle. The entire mass was removed; it was completely extraperitoneal. On opening the peritoneal cavity, we were surprised not to find another large chocolate cyst. The uterine fundus stood erect and tense, and was unusually large for a girl of fourteen. As we followed the outline of the fundus downward there was an unusual change in its contour so that it roughly resembled an hour-glass. The lower bulging portion was tense and semicystic on palpation, and extended considerably deeper into the pelvis than would be suspected from inspection alone. The right ovary was in the same condition as cited at the previous operation. The right fallopian tube appeared normal and pervious. There was no evidence of any bloody material having escaped through the tube into the peritoneal cavity nor of any endometrial grafts on the peritoneum or intestines. Presumably there was a condition of hematometra with congenital absence of the lower section of the vagina, due to failure of fusion of the two embryonic buds which give rise to it by a process of coalescence before birth.

From the comparatively great size of the cystic swelling which merged into the lower end of the uterine body I hoped that the upper portion of the vagina and the cervix uteri were normal in development, and that we might by continuing the approach from below reach them and provide an outlet rather than do a hysterectomy. Dr. Harper kept his hand on the uterine fundus while I dissected from below. After placing a catheter in the urethra by blunt dissection I enlarged the cavity in the tissues behind the hymen to a depth of about 7 cm. and I felt a tense bulging fluctuant mass. As I incised this there was an immediate escape of a column of black tarry substance, of such thick consistency that it retained its columnar shape as it continued rapidly to escape through the 1-inch opening I had made. There seemed to be an enormous amount of the substance, and as Dr. Harper squeezed the fundus uteri and more of the substance came through, the size of the fundus diminished appreciably. On inserting the index finger through the opening it entered a capacious smoothly lined sac. I could not find anything which resembled a cervix uteri, but the curved artery clamp with which I felt around entered an opening toward the antero-superior part of the cavity and Dr. Harper assured me the forceps were distinctly in the uterine cavity. I then undermined the marginal remains of the greatly thickened hymen and the adjacent skin for several centimeters, and by traction on the edges of the opening in the sac and blunt dissection of the tissues around it I was able to introduce a series of interrupted sutures of chromic catgut uniting the edges of the hymen with the sac. A rather large pack of vaselined iodoform gauze was placed in the assumed vaginal canal.

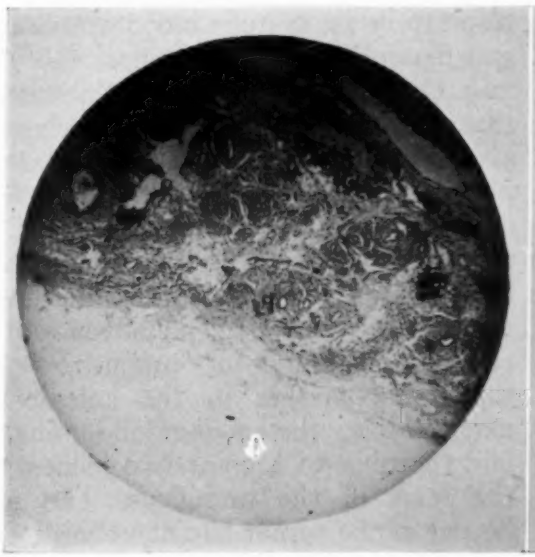

Fig. 16. Cross section of wall of chocolate cyst. Implants *a* and *b* (× 25).

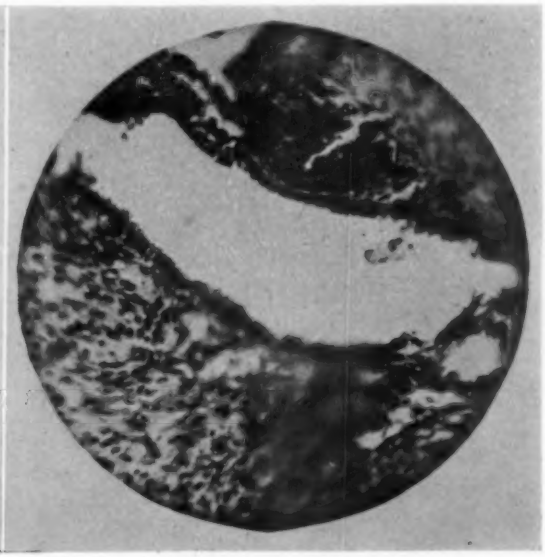

Fig. 17. Implant in wall of chocolate cyst (× 175).

From the large amount of dammed-up menstrual flow released it is apparent that considerable cystic swelling due to hematometra must have been present at the time of the first operation but was overlooked because of the great interest taken in the chocolate cyst.

Microscopic study showed endometrial implants in the tissue (Figs. 16, 17 and 18).

Discussion. Comments in the recent literature on the etiologic factors involved in the production of chocolate, or Sampson's, cyst point toward two possible methods of origin: (1) They may be due to congenitally misplaced endometrial cells; (2) they may be due to some condition in the uterine canal causing an obstruction

which permits the escape, during menstruation, of endometrial cells through the fallopian tubes to find lodgment in the ovary or peritoneal surfaces. The absolute obstruction to the escape of the menstrual flow in this patient is strictly corroborative of the theory of obstruction as a factor. The patient has had one normal menstrual period since the last operation and a practically normal vaginal canal is now present.

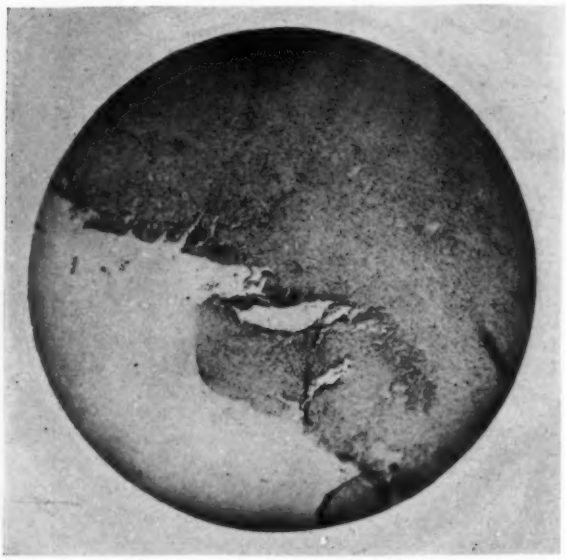

FIG. 18. Miniature endometrial cavity in wall of chocolate cyst (× 25).

ADENOCARCINOMATOUS CYST OF SPLEEN

This patient was a farmer's wife, forty-eight years old, and mother of four children; her youngest child was fourteen years old. The patient came to the Clinic three weeks ago complaining of a tumor in the left upper part of the abdomen, and of a constant sense of soreness in this region. She had noted the soreness for nine months, and the presence of the tumor for three months, before admission. The size of the tumor had been gradually increasing. The patient also complained of steadily increasing asthenia and of dyspnea on exertion with a feeling of continual weight and discomfort in the upper part of the abdomen accompanied by progressive anemia.

Menstruation had begun at the age of twelve. She had had regular four-day periods; the last period was six weeks ago. She had been in good health until the present illness. There was no history of digestive disturbances, diarrhea, jaundice, loss of weight, fever, sweats, chills, or hemorrhages of any kind, nor of any genito-urinary disturbances. For some weeks she had noted transitory edema of the lower extremities.

Physical examination. The patient was fairly well nourished. Her weight was 134 pounds, pulse rate 86, temperature 100°F., respiration 24, systolic blood pressure 150, and diastolic 90. She was noticeably anemic. On examination the teeth, nose, and throat were found normal. The chest was also found normal. The superficial lymphatic glands were not palpable. The abdomen was somewhat distended, but there was no rigidity, and no evidence of ascites. In the upper left quadrant was a visible mass which on palpation and percussion was found to emerge from under the costal margin in the splenic area, extending to the median abdominal line and reaching to a point two inches below the level of the umbilicus. The mesial border of the tumor had the characteristic palpable outline of an enlarged spleen. The mass was dull to percussion and was only slightly movable, giving the impression of being firmly attached by its upper pole. Vaginal examination revealed a movable cystic tumor of the right ovary about 6 cm. in diameter. There was slight edema of the ankles and feet. The urine was amber colored, the specific gravity 1.016, and the reaction acid; there was no albumin, sugar, or bile. The Wassermann reaction was negative. The hemoglobin was 52 per cent; the erythrocytes numbered 2,850,000, and the leucocytes 3850: 56 per cent polymorphonuclears, 3 per cent large lymphocytes, 39 per cent small lymphocytes, and 2 per cent eosinophiles.

A probable diagnosis of splenic anemia or Banti's disease was made and splenectomy advised. At the operation which was made two weeks ago I found a tumor mass consisting of the spleen which was itself enlarged to four times its normal size, and

numerous cystic tumors varying in size from 1 cm. to 10 cm. in diameter; these were incorporated in and sprang from the splenic texture, while completely surrounding and firmly attached to the convex border of the spleen was a huge crescent sausage-like thick-walled cyst, the capsule of which was quite firmly adherent to the diaphragm for a considerable area (Fig. 19). The smaller cysts were quite translucent in places and lustrous with a yellowish green background.

On account of the markedly adherent condition of the large cyst to the diaphragm the splenic pedicle was ligated and divided before any attempt was made to free and mobilize the mass. On separating the adherent capsule from the diaphragm there was noted a rather ominous venous oozing in spite of the preliminary ligature of the splenic pedicle. This oozing was controlled by placing in situ a 5-yard hot salt pad as advocated by Balfour. No ascitic fluid was noted in the abdomen and there was no gross evidence of hepatitis. The gall bladder contained a single large stone. The tumor of the right ovary was examined only in a cursory manner and appeared to be a simple cystoma. It was not removed. Convalescence was satisfactory and uneventful.

One of the cysts was opened and found to contain a semi-gelatinous substance resembling in appearance and consistency old-fashioned wine jelly. The pathological condition was such an unusual one in our experience that the gross specimen was sent to Dr. A. C. Broders, Section on Pathology, Mayo Clinic. Broders reported that the condition was one of carcinomatous cystadenoma of a low degree of malignancy, which he believes was primary in the ovary with secondary invasion of the spleen. In view of this report we decided to remove the ovarian cystoma which was noted at the previous operation.

Operation. The abdomen was opened by a median suprapubic incision but the hand failed to find the globular mass of the cyst. It had ruptured and collapsed; there was some free clear fluid in the pelvis. The sac was translucent and had the appearance of the wall of a simple ovarian cyst. Inside the sac where it sprang from the ovary there was a small amount of white gelatinous material (about 0.5 ounce) which did not at all resemble the material found in the splenic cystadenoma. The left ovary appeared to be perfectly normal. We removed it as well as the right one, inasmuch as there are undoubted cases on record in which advanced multiple metastatic masses secondary to carcinomatous ovarian disease have withered and disappeared following excision of the mother growth and ovaries, suggesting that some internal secretion of the ovary may be the exciting stimulus for the continued proliferation and growth of the daughter cells. There was no gross evidence in this case of any pin-head-sized or larger contiguous or metastatic growths on the fallopian tubes, uterus, peritoneum, intestines, or mesentery so generally found in cases of malignant ovarian cyst.

Fig. 19. Polycystic adenomatous spleen.

Note. Subsequent history shows that convalescence was uneventful. On June 10, 1927, eight years after splenectomy, the

patient reported at the Clinic for periodic examination. She stated that her general health since the operation had been good and that she had no complaints at this time. Physical examination was negative. The hemoglobin was 85 per cent; the erythrocytes numbered 4,590,000, and the leucocytes 9700; the color index was 0.7; 39.3 per cent of the differentials were polymorphonuclear neutrophiles, 57.3 per cent lymphocytes, 2.7 per cent transitionals and 0.7 per cent eosinophiles.

Discussion. Pathological examination of the ovarian cystoma and of the ovaries failed to show any evidence of abnormal cells except those characteristic of simple ovarian cystoma. If the opinion that the splenic tumor was probably of ovarian origin is correct, this carcinomatous cystadenoma of the spleen must be classed as one of secondary type, while failure to find any primary source of origin in the ovarian tissues throws doubt on this conjecture. It is possible that the primary area was overlooked in making the serial sections. The continued good health of the patient after a lapse of eight years eliminates the possibility that the splenic tumor was secondary to an undiscovered diseased third ovary as suggested at the time by another pathologist.

There is meager reference in the literature to splenic carcinoma. Textbooks mention its infrequency. Primary carcinoma of the spleen seems to be practically unknown and the apparent high degree of immunity possessed by this organ to metastatic neoplasm is emphasized by the relative infrequency of reference to the subject in the literature. The possibility of the lesion being of the so-called peritoneal inclusion type was considered, but discarded by the pathologists.

THE VALUE TO THE SURGEON OF
THE BASAL METABOLIC RATE
CONCLUSIONS BASED ON A STUDY OF 3085 REPORTS

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ONE of the questions most frequently asked relative to the subject of goiter is that concerning the value of the basal metabolic rate in determining the right time for operation. About five years ago one of the leading authorities on goiter stated that he had little or no confidence in reports from the metabolic laboratory and that he felt these tests were misleading. However, for one in his position who came in contact with many cases of goiter daily, clinical judgment might perhaps be more accurate than laboratory data, but for the physician whose experience is more limited, I maintained that the metabolic laboratory might furnish valuable information. Time has not altered my views; on the contrary, I find with added experience that the metabolic laboratory furnishes data that are indispensable for my work. There are, however, certain conditions bearing on the accuracy of these reports which I emphasized at that time and which I now repeat.

If the determination of the basal metabolic rate is to be of any value to the surgeon the following requirements must be met: (1) The metabolism machine must be reliable and in perfect running order; (2) the technician must be competent; (3) the test must be performed under proper conditions; (4) the test must be repeated one or more times in certain cases before it may be considered accurate; (5) the person interpreting the result of the test must be experienced and competent.

In this short dissertation I do not intend to discuss technical details relating to the laboratory, but merely to consider the clinical value of the metabolic test. Consequently it will suffice to say that while there may be reliable metabolic units with which I have had no personal experience, I do know that the determinations made with a number of outfits have no scientific value. A cheap unreliable metabolic unit is harmful in anyone's hands, because the results are not only misleading but may influence one's better clinical judgment. The metabolism unit employed at our Clinic, the Tissot gasometer (Figs. 1 and 2), is similar to that used by Plummer and Boothby, and it has always given absolute satisfaction. The principal objections to be brought against such a unit are the initial expense and the cost of a well-trained technician, but with such a laboratory one experiences the same satisfaction that he does from driving a well-constructed automobile. Undoubtedly a great deal of the criticism of the basal metabolic reports has resulted because of inaccurate determinations with poor machines. I have known high rates to be reported in cases of hypothyroidism, and low rates in cases of exophthalmic goiter. The greatest source of error is seen when abnormally high rates are reported in the case of normal patients. Even a reliable metabolic unit may prove unsatisfactory unless the technician is qualified for the position. With the Tissot-Haldane method the greatest accuracy is essential as I can testify from personal experience. Usually two tests are run and the percentage of error must not be more than one-half of 1 per cent.

If the patient has eaten, has been exercising, has a cold, a sore throat, or fever from

any cause, the test is not accurate. Likewise unduly nervous persons may have a high rate even when the metabolic machine and the technician are reliable. This error may be often avoided by first explaining the test to the patient and thus allaying any apprehension. In any case, when considering the possibility of exophthalmic goiter, unless the clinical symptoms are clear cut, too much importance should not

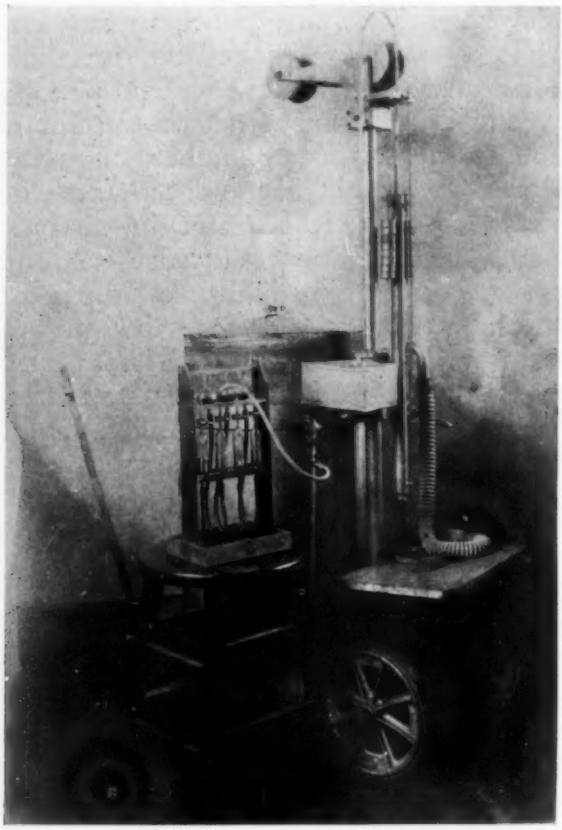

Fig. 1. Tissot metabolic unit, with Haldane analysis apparatus, used in determinations of these studies.

be attached to any readings between plus 10 and plus 25 per cent. In case of toxic adenoma a rate of between plus 20 and plus 30 per cent must be considered significant. Whenever there is any doubt the test should be repeated one or more times.

The interpretation of the result of the basal metabolic rate is an important factor to be considered. For a surgeon to attempt to diagnose on the basis of a metabolic test before he is familiar with all the clinical phases of thyroid disturbance is like diagnosing chest lesions by means of the roentgenogram before learning to use one's eyes and ears. Before the surgeon uses a metabolic laboratory he should be so familiar with goiter cases that he can estimate the metabolic rate within 10 or 20 points of the laboratory reading.

CASE REPORTS

Case 1. The first patient represents a typical case of exophthalmic goiter in which

Fig. 2. Patient receiving metabolic test by Tissot gasometer method. Note tubes for intake and outlet.

conclusive evidence is furnished by the history and the clinical findings. This is the acute form of the disease, the patient having been ill only three weeks. The thyroid gland was visibly and palpably enlarged. Exophthalmos was marked, considering the short duration of the symptoms. The rapid loss of weight (30 pounds) together with the extreme restlessness, the high pulse pressure, and the onset of a gastrointestinal crisis, all suggested a severe form of the disease and a high metabolic rate. The patient was on the verge of a crisis and was in no condition for operation. (Figs. 3 and 4.)

This opinion was corroborated by a high metabolic rate of plus 78 per cent. After five days' preparation with iodine, forced diet, rest and sedatives, the patient's condition appeared remarkably improved and he might be considered ready for operation. A metabolic rate of plus 60 per cent at this time suggested, however, that further preparation was needed. Four days later the rate fell to plus 50 per cent and primary thyroidectomy was performed followed by uneventful convalescence. Experience had convinced me that this patient had reached the maximum point of improvement but it was gratifying to know that the metabolic rate indicated that he was within the safety zone. Three weeks after operation the rate was plus 5 per cent, but the patient was considered neither cured nor dismissed from observation.

Fig. 3. Basal metabolic rate in this case was plus 66 per cent. The acute onset and severity of symptoms were accurately indicated by the high rate.

Fig. 4. Same patient as in Figure 3, six weeks after operation; the basal metabolic rate had come down to plus 2 per cent.

Comment. All these patients are placed on a careful postoperative regimen and kept under close observation for one or more years. If the metabolic rate returns to normal and there is a steady gain in weight and strength I feel that there is no indication to continue the use of iodine after the patient leaves the hospital. Although three months after operation these patients may appear to be cured, I feel that they should for a time be considered in the same class as tuberculous patients that have recovered. They should avoid any mental or physical strain, should practice moderation in everything and thus by keeping themselves in condition guard against possible recurrence. I do not believe in making chronic invalids of these patients, and our records indicate that more than 90 per cent of them resume their normal occupation, but I do believe it is possible to avoid recurrence in certain cases.

Case II. The second type of case illustrates the chronic, mild, low-grade form of exophthalmic goiter. The patient complained only of slight nervousness and palpitation. The onset of symptoms had been gradual over a period of nine months. There was no visible or palpable enlargement of the thyroid gland, no thrill or bruit, and no exophthalmos, but slight tremor. The pulse rate was 92; the systolic blood pres-

sure was 120, the diastolic 78. There was no quadriceps loss; the skin was warm but not moist. The patient sat rather quietly. The history showed little that is significant. The patient's weight was perhaps 10 pounds less than normal. The appetite was good but not excessive. The symptoms were about as much in favor of, as against, the diagnosis of exophthalmic goiter. If, for instance, the three best diagnosticians in the country were to examine this patient they would probably not agree on the diagnosis. At this point it is perhaps well to repeat that an emergency operation is never indicated in case of exophthalmic goiter. The diagnosis should be confirmed beyond a doubt. On the other hand, once the diagnosis has been confirmed, delay in operating only results in grief to the patient and to the surgeon. In this case the metabolic rate of plus 30 per cent neither confirmed nor refuted the suspected diagnosis. The patient was given iodine as a therapeutic test but there was only slight response and the rate remained plus 25 per cent. Under the circumstances I did not feel justified in advising operation. The patient was kept under close observation for four months. At times there was general improvement and the rate fell as low as plus 19 per cent and at no time did it exceed plus 30 per cent. Then, following a hot spell, the rate jumped to plus 46 per cent; the patient seemed keyed up; the appetite became excessive and she began to lose weight. In spite of the absence of most of the typical symptoms of this disease and the atypical history the diagnosis was evident.

FIG. 5. The basal metabolic rate in this patient was only plus 12 per cent, and effectively ruled out a possible diagnosis of hyperthyroidism.

FIG. 6. In this case of exophthalmic goiter the patient had undergone medical treatment elsewhere for more than a year. The basal metabolic rate of plus 30 per cent is no indication of the damage to the cardiovascular system that had occurred.

After three weeks' preparation with iodine the rate fell to plus 14 per cent and there was marked clinical improvement. At operation a rather large friable hyperplastic gland was found with only slight reversion to colloid. The appearance of the gland would seem to indicate greater toxicity in the clinical picture than was found.

Comment. I criticize myself for delaying thyroidectomy and yet I did not feel that the diagnosis was quite clear cut, and the

patient was given every opportunity to recover without operation. The results of the metabolic rate in this case consistently followed the course of the disease. The case is atypical and in my experience is one of the most puzzling and chronic I have seen.

Case III. In the third case the reader may hazard his own diagnosis before reading the summary. The patient, aged thirty, had been in good health until six months previously.

Fig. 7. This patient had a basal metabolic rate of plus 64 per cent. In this case it did not truly indicate the severity of the disease.

Fig. 8. Same patient as in Figure 7. Following the use of iodine the basal metabolic rate fell to plus 49 per cent. Three weeks after operation the rate was plus 8 per cent.

Following illness in the family and the birth of her child she had lost 35 pounds and had become weak and extremely nervous. The relatives had noticed slight prominence of her eyes and she had noticed weakness on climbing stairs, palpitation on exertion, and considerable dyspnea. Examination showed symmetrical enlargement of the gland with questionable bruit. The skin was warm and there was a slight tremor. The systolic blood pressure was 130 and the diastolic 80. The pulse rate was 96. The patient's uncle, who had recently recovered from severe exophthalmic goiter, brought her to the Clinic because her symptoms appeared to be identical with his. In such borderline cases as these I feel that it is a great help to know the basal metabolic rate. The possibility of thyroid trouble was entirely eliminated by a normal rate of plus 6 per cent. When lactation was stopped, and help and rest provided for the mother, there was marked general improvement. (Fig. 5.)

Comment. It is perhaps in these doubtful cases that the metabolic laboratory proves of greatest value. I consider a negative report such as this, made under proper conditions, as conclusive evidence. In this connection I should like to mention that many persons come to me believing they have goiter; some of them have been advised to have an operation. I may tell them that the clinical evidence does not warrant an operation but I find that their confidence in the report of a metabolic rate is more staunch than in an opinion based merely on clinical examination. A normal metabolic rate is reassuring to the patient and to the physician.

Case IV. The fourth patient, fifty-eight years old, had complained for the past two

weeks of general tremor of the entire body. There was little in the history or physical examination on which to base a diagnosis. The heart rate was remarkably slow, 78 beats a minute. The pulse pressure was increased, however, and there was marked tremor, with considerable fatigue and nervousness. While exophthalmic goiter was suspected, the pulse rate seemed to eliminate this condition. A metabolic rate of plus 56 per cent, rapid improvement on administration of iodine, and

Fig. 9. From general appearance this patient might seem to be suffering from toxic adenoma. A normal metabolic rate eliminated the possibility of hyperthyroidism.

the finding of a typically hyperplastic gland at operation, however, confirmed the diagnosis of exophthalmic goiter (Fig. 6).

Comment. In my experience with such cases this was the first instance in which I had seen these symptoms in association with such a degree of toxicity. It merely illustrates that daily experience adds to our knowledge and that the ridicule often directed against modern laboratory diagnosis may frequently be turned to triumph by the technician.

One day recently I found in my office a patient who evidently had exophthalmic goiter. There is something so characteristic about many of these patients that even a stenographer who constantly sees them can hazard an opinion. Most of you have heard the story of the big business man who vainly spent considerable time and money consulting leading specialists and finally had a bootblack in the vicinity of a large clinic tell him that the doctors would soon cure him of his goiter. In the case of my patient it was evident from her constant moving about that the thyroid was overactive. Some things about these persons are learned apparently only from repeated observation, facts that are not written in books and cannot be deducted from laboratory data. One learns to have considerable respect for the extremely restless, fidgety type of patient. The metabolic rate, which in this instance was only plus 64 per cent, does not truly express the severity of the disease, nor the degree of reaction that may be expected following operation (Figs. 7 and 8). Experience alone will aid in the analysis of such cases.

The metabolic rate may be plus 80 per cent in a person who has recently passed through a crisis. The rate may be falling and the patient improving. This rate is of less significance than one of plus 50 per cent in the case of a person on the verge of a crisis in which the disease is progressing rather than subsiding.

What is more gratifying than to watch a rate drop from plus 70 to plus 50 per cent during the preoperative period of preparation, and to normal three weeks after operation! Most of us feel that the patient is better after thyroidectomy when he himself says so, but it is a satisfaction to know by means of scientific data that the operation has proven successful and that we can usually give a favorable prognosis.

On the other hand, how disturbing it is to find that three weeks or even six weeks

after operation the rate is still plus 20 or plus 30 per cent. This information, however, may save the patient from further discomfort and the surgeon from embarrassment. It may mean one of several things. The patient is overdoing and not building up as he should. Even the remnant of gland left may have been so active as to cause persistence of hyperthyroidism. The surgeon may not have removed sufficient gland. If the proper amount of rest and the use of iodine are insisted on, the rate in a week's time may be brought within normal limits. Whether or not it will remain there and the patient recover his health can only be determined by a careful follow-up of the case and a study of the metabolic rates.

THE METABOLIC RATE IN CASE OF ADENOMATOUS GOITER

In the case of the adenomatous form of goiter the metabolic rate furnishes valuable confirmatory and diagnostic information. In general we know that persons less than thirty years of age who have adenomatous goiter have a normal metabolic rate and consequently the goiter is non-toxic. When the patient is more than forty there is an increasing tendency for such a goiter to become toxic. The onset of symptoms, however, is so gradual and insidious that the patient is seldom aware of his trouble. (Fig. 9.) I do not believe anyone can determine accurately in a given number of cases of this type whether or not the goiter has become toxic. It is in such instances that the metabolic rate is of great diagnostic value. It may be necessary to repeat the test more than once and to consider the information carefully, but as a rule the report is most helpful. If the rate is normal the possibility of hyperthyroidism is at once eliminated. If the rate is plus 25 per cent and the patient unduly nervous, a second test may show a normal reading. Even a single test with a reading higher than plus 30 per cent usually indicates hyperthyroidism. In my experience the metabolic rate in cases of toxic adenoma rarely exceeds plus 65 per cent. In any case, when the rate exceeds plus 50 per cent I study the patient again to consider the possibility of superimposed exophthalmic goiter. If there is any doubt, iodine should be given since, if exophthalmic goiter is present, marked improvement may be expected. On the other hand, I have observed no benefit following the administration of iodine in cases of toxic adenoma.

A patient may be in an almost dying condition as a result of toxic adenoma and yet have a metabolic rate of only plus 30 or plus 40 per cent. The metabolic rate is not an index of the degree of cardiac involvement. In long-standing cases of toxic adenoma there is serious and permanent damage to the cardiovascular-renal system which of course is not registered by the metabolic rate. Consequently, in these cases the rate may merely confirm the clinical diagnosis, but in no sense should it be considered as a criterion of the risk of operability.

THE METABOLIC RATE IN CASE OF IODINE HYPERTHYROIDISM

Although adenomatous goiter does not of itself become toxic in the case of patients less than thirty years old, hyperthyroidism may be induced by the injudicious use of iodine. A number of cases of iodine hyperthyroidism in young persons has been observed at the Clinic. In many instances the metabolic rate did not exceed 30 per cent and by promptly withdrawing the drug, giving mild sedatives and advising rest it was possible to abort the symptoms. In other cases it was observed that the metabolic rate was as high as plus 65 per cent and in 3 instances fatality occurred in spite of all medical measures. The attention that has been directed against the promiscuous use of iodine in the case of adults having adenomatous goiter may possibly be the cause of the rapid decline in the incidence of this condition. A few years ago little attempt was made to differentiate

between the various forms of goiter, and iodine was freely administered for the adenomatous as well as the colloid type.

SUMMARY OF 3085 REPORTS

Table I shows an analysis of 3085 reports that have been made in our basal metabolic laboratory. It is not the purpose of this paper to discuss the result of these tests in diseases other than goiter. It is sufficient to say that except in the case of myxedema, little significance is attached to the reports except for the purpose of eliminating hyperthyroidism. It is of interest to know what the metabolic rate is in case of pregnancy, anemia, cancer, gastric achylia and various other conditions, but the result of the test does not greatly alter the judgment of clinicians.

The averages in our laboratory for the various forms of goiter before and after treatment are reported in Table II.

TABLE I

CLASSIFICATION OF DISEASES IN WHICH BASAL METABOLIC RATE WAS OBTAINED, 1920 TO 1927

Condition	Cases
Exophthalmic goiter	1059
Toxic adenoma	545
Non-toxic adenoma	473
Colloid goiter	188
Nervous exhaustion, neurasthenia, and neurosis	133
Iodine hyperthyroidism	114
Hypothyroidism	86
Obesity	52
Myxedema	37
Miscellaneous	36
Multiple adenoma	35
Chronic tonsillitis	30
Menopause	28
General debility	25
Achylia gastrica	23
Hypertension	22
Pregnancy	19
Endocervicitis	14
Postinfluenzal debility	12
Froelich's syndrome	11
Tachycardia	10
Eczema	9
Dental sepsis	9
Myasthenia	8
Myocarditis	7
Cretinism	6
Chronic constipation	6
Chronic urethritis	6
Anemia	6
Psychasthenia	6
Amenorrhea	6
Nasal obstruction	5
Chronic cholecystitis	5
Chronic arthritis	5
Carcinoma of the thyroid	5
Lues	3
Mitral stenosis	3
Tetany	13
Acute tubular nephritis	2
Endocarditis	2
Proctitis	2
Epilepsy	2
Pulmonary tuberculosis	2
Headache	2
Arteriosclerosis	1
Exhaustion from work	1
Myalgia	1

TABLE II

AVERAGE METABOLIC RATE IN VARIOUS FORMS OF GOITER BEFORE AND AFTER TREATMENT

Type	Cases	Basal Metabolic Rate		
		On Admission, Per Cent	After Administration of Lugol's Solution, Per Cent	After Operation, Per Cent
Exophthalmic goiter	1059	+57	+37	+6
Toxic adenoma	545	+32	....	+4
Non-toxic adenoma	513	+ 6	....	+2
Colloid goiter	188	+ 3		
Iodine hyperthyroidism	114	+35	....	+4

CONCLUSIONS

1. The basal metabolic rate may furnish valuable information to the surgeon providing the test is made by a reliable machine, an accurate technician, and under the proper conditions.

2. Before attempting to interpret the results of metabolic studies the surgeon should be thoroughly versed in clinical studies of thyroid disease.

3. In exophthalmic goiter the metabolic rate gives valuable data regarding the result of the preoperative treatment, likewise regarding the result of operation, and the prognosis.

4. The metabolic rate is not an index of the risk of operability in toxic adenoma, but it does give diagnostic evidence of the presence or absence of hyperthyroidism.

OPEN REDUCTION

A REPORT OF 122 CASES

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OPEN reduction or operative treatment of fractures is both praised and condemned by men of the medical profession. In this report of 122 cases (tabulation), we shall endeavor to show why we have praised rather than condemned this type of treatment.

The procedure of closed reduction in doubtful cases has little in its favor except that there is less danger of infection. Results are not so satisfactory as in the open reduction, the healing time is increased, and adjustment of splints and braces must be made more frequently. The time spent in doing the reduction may or may not be shorter.

Open reduction allows absolute approximation of fragments, shortens the healing period, allows earlier manipulation and motion, a greater percentage of anatomical positions and better functional results.

Open reductions are almost universally satisfactory in the hands of surgeons who are familiar with the technique, and who have at their disposal proper instruments and other facilities necessary for this procedure.[1,2,3,4,5,6] The surgeons who condemn the open reduction are usually those who have not tried it, or those who have tried it, but, because of faulty technique, have met with complications that should have been avoided. This procedure cannot be carried out as simply as the closed reduction, but there should be no fear of untoward results if the surgeon has trained assistants, the necessary instruments, and above all, a knowledge of the technique.

The technique, which at first appears complicated, is quite simple in actual practice and can be carried out by any good operating-room staff. Infection is the bugbear which is most to be feared and this is eliminated to a great extent when proper technique is employed. Few, if any, cases with infection end fatally if adequate drainage is established and the Carrel-Dakin treatment instituted. The infection will clear up and union will result without any permanent disability, but there will be a larger scar on the skin.

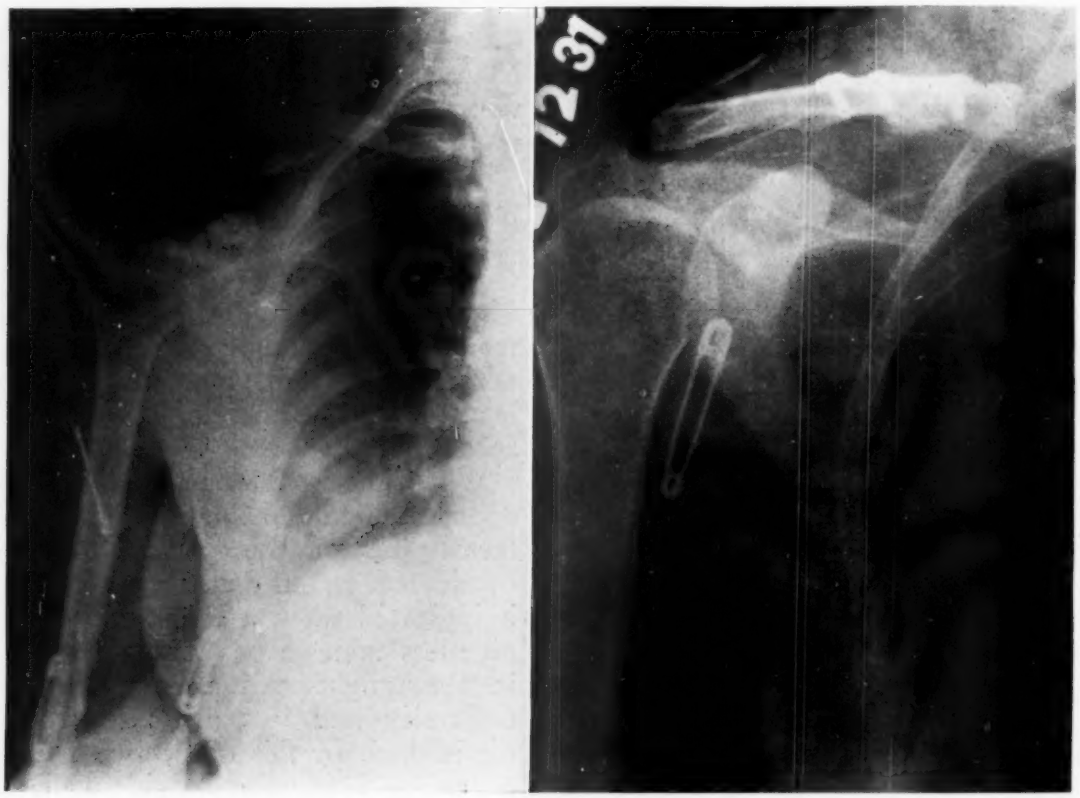
We use various means of fixation of the fragments in our cases of reduction; these include Sherman plates and self-tapping screws, nails, bolts, phosphobronze wire, Martin-Parham bands, staples, kangaroo-tendon, and chromicized catgut. We do not use bone screws, bone plates and ivory inlays in our own cases, but they are used successfully by some.

When a closed reduction insures good approximation and the possibility of satisfactory function the open operation is not considered. In our opinion, open reduction is indicated when a closed reduction will give less than 60 per cent approximation in the weight-bearing bones, and when deformity and loss of function can be diminished. In this connection the roentgenogram is a valuable aid in diagnosis, but it is not regarded without considering clinical findings as well. Open reduction is also the method of choice in case of compound fracture with extensive laceration and poor approximation of fragments. In these cases, however, the wound is left open and Dakin's solution applied for as long a time as is necessary to get union. When union has taken place the plate is removed and the wound allowed to close.

In the past fifteen years in this Clinic, 122 patients with fracture were treated by the open method. There was infection in the case of three of these patients, two of whom died. They were among the first of

the series; the third patient was treated about six years ago. Since that time there has been no case of infection. In the first of these 3 cases the patient infected the wound with feces; the second case was that of a cachectic patient who was in poor condition. In the third case the infection was due to contamination of instruments and was the only one of the three that was treated by the Dakin-Carrel method. In this case there was rapid convalescence, with perfect union and function.

We feel that in most cases of open reduction the period of recovery is shortened to about two-thirds as compared with the closed method; in some it is reduced even more. This factor is of sufficient economic importance to demand serious attention in industrial and insurance cases as well as in private cases.



a *b*

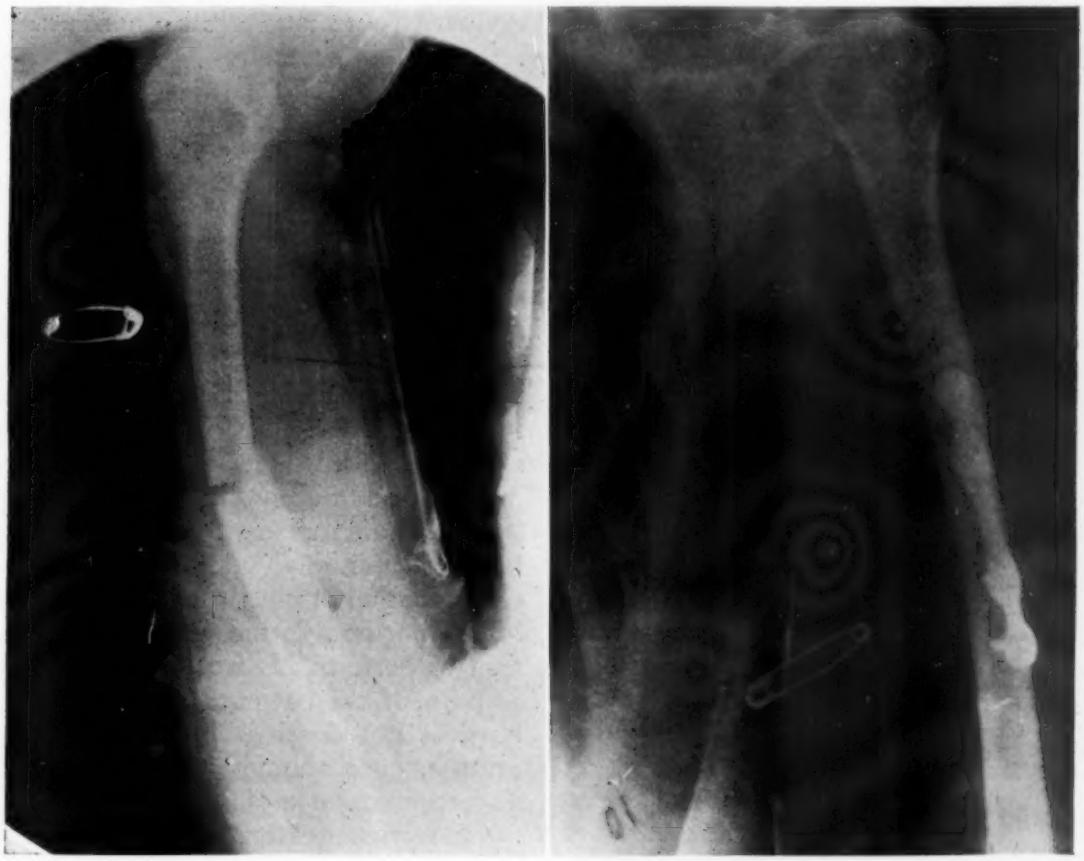
FIG. 1. Fracture of clavicle: *a*, before reduction; *b*, after reduction.

TECHNIQUE

To prepare the patient, the skin at the site of operation is thoroughly cleaned by using alcohol and ether and applying a 3 per cent solution of iodine or a 5 per cent alcoholic solution of picric acid. This renders the skin less septic although it is far from sterile.

The incision is made over the site of fracture. This should be sufficiently long to facilitate handling of instruments and to avoid the necessity of enlarging the incision later. Bleeding vessels are ligated and the skin margins are covered with towels held in place by Bacchus or Moynihan towel clips. In some instances Michael wound clips may be used to advantage, but in our experience the Moynihan clamp has been the most satisfactory. These are placed at intervals of not more than 1 inch. The complete block of all skin margins is essential. Whenever possible, the scalpel should be plunged to the bone and the muscles divided from within outward, although this is not practical in all

approaches. The cut muscles are separated by retractors to permit a view of the bone ends. The bone ends are freed from muscle with a periosteal elevator. The bones are grasped near the site of fracture with Lane clamps; Berg clamps are substituted when a Berg extension clamp is to be used. The bone ends are freed from blood clots and muscle fragments by curettage, and enough extension is applied to overcome any overriding. This is easily accomplished when the Berg clamp is used. The Berg clamp maintains its reduction as long as it is applied. When the overriding is reduced without the Berg clamp, it may be done by bringing both bone ends out of the wound, approximating the fractured ends and then returning the bone to the normal position. Once a reduction has been accomplished, it should be maintained by some suitable clamp such as the Lane clamp. A Sherman plate is then applied and held in place while holes are drilled into the bone with a No. 32 Brown and Sharp drill. One or more screws in each fragment should pass through both cortices of the fragment. The Sherman self-tapping transfixion screws of the right length are then driven into the holes to hold the plate. Calipers are used to determine the diameter of the bone, so that the screws for transfixion may be of sufficient length to hold in both cortices and not extend beyond into soft tissue. After all the screws have been driven in firmly, the clamp maintaining the reduction should be removed and the incision closed with as little catgut as possible. The skin is closed with Michael wound clips or with silk. A dressing is applied and also a supporting splint, cast, or whatever is indicated in the individual case. Early mobilization of the joints is advisable in these cases and mas-



a *b*

Fig. 2. Fracture of right humerus in middle third: *a*, before reduction; *b*, after reduction.

sage and passive manipulation is instituted within ten days.

It is imperative that the surgeon, in doing this type of work, should have a complete armamentarium and a sufficient number of assistants. The rigid Lane technique which is essential may be a point

Fig. 3a. Fracture of both condyles of left humerus: before reduction.

of trouble for some surgeons. It may be simplified if the surgical nurse hands instruments from her table to the surgeon with forceps. When the surgeon has finished with an instrument he drops it into a basin containing hychlorite or sterile water. The second nurse removes it from the basin and washes it in sterile water if it is taken from hychlorite, or sterilizes it in alcohol if it is removed from water, and returns it to the instrument table. The entire procedure is carried out by the use of forceps, the surgeon being the only one to touch the instruments with gloved hands.

In fracture of the tibia or clavicle, or in any compound fractures, the plates are removed routinely. In all other cases they are left in place. In one of our cases (Case 6) a roentgenogram, taken ten years after the open reduction, shows the nails still in place.

SELECTION OF CASES

Until recently the general surgeon and general practitioner have been concerned more with union than with functional results. If in a case of fracture of the femur the patient could walk, even though he limped and had pain, the result was considered good. Since cases of industrial injury and automobile accidents have become more numerous, this is not a satisfactory functional result. We must consider whether or not the patient can resume his former occupation with sufficient function to perform his work without distress or pain. If the patient limps and has pain he does not consider himself functionally normal, even though union may be solid and approximation fair.

Corrective measures must be taken in the first week or ten days by either the closed or open method. If the closed method is unsatisfactory during the first week there is still ample time for the open method. To wait for from six weeks to six months complicates matters, because during that period some damage may have been done that cannot be corrected.

It is our practice in the case of simple fracture to consider the closed reduction first. When this is not satisfactory we wait for from eight to ten days from the time of the fracture before doing open reduction. This allows time for swelling to decrease,

blood clots to be absorbed, and small vessels to heal that may have been traumatized at the time of the fracture. At the end of ten days the tissues have developed more resistance, and if extension has been carried on during this period, reduction is more easily accomplished and the tissues are in much better condition to combat possible infection.

Fig. 3b. Fracture of both condyles of left humerus: after reduction.

COMMENT

Sherman,[4] in more than 1500 cases of open reduction, found infection no more prevalent than in any elective operation. He repeatedly emphasizes the necessity of correct technique. He considers the laparotomy technique of the general surgeon not only insufficient but dangerous. Gloved hands should never come in contact with the skin or be introduced into the incision. Proper instruments will suffice for the necessary steps and lessen the danger of contamination. He further maintains that open reduction is contraindicated except when the armamentarium and operative technique are available.

Sherman has probably done more than any other one man to promote the successful treatment of fracture. Acknowledgment is made to him for his willingness in aiding us to gain more experience in this method of treatment, for improvement in our technique, and for suggestions regarding postoperative treatment.

We are reporting here 9 cases from our series which represent the more common fractures that have been treated by the operative method. These are the more typical cases in which open reduction is easily done by the general surgeon with proper armamentarium and technique. In the treatment of these cases plates, bolts and nails were used.

Our series is small, but coming from a non-industrial locality it is of some value, we trust, in showing the advantage of the open reduction when facilities permit.

REPORT OF CASES

Case 1. A woman, aged thirty-six, sustained a fracture of the clavicle on December 25, 1926, in an automobile accident. On December 28, after three unsuccessful attempts at reduction, open reduction was done and a four-screw Sherman plate applied. Convalescence was uneventful. On January 6, 1927, the patient left the hospital, and returned on

a *b*

FIG. 4. Oblique fracture of upper end of ulna including olecranon from shaft of left ulna: *a*, before reduction; *b*, after reduction.

a *b*

FIG. 5. Fracture of both bones of left forearm: *a*, before reduction; *b*, after reduction.

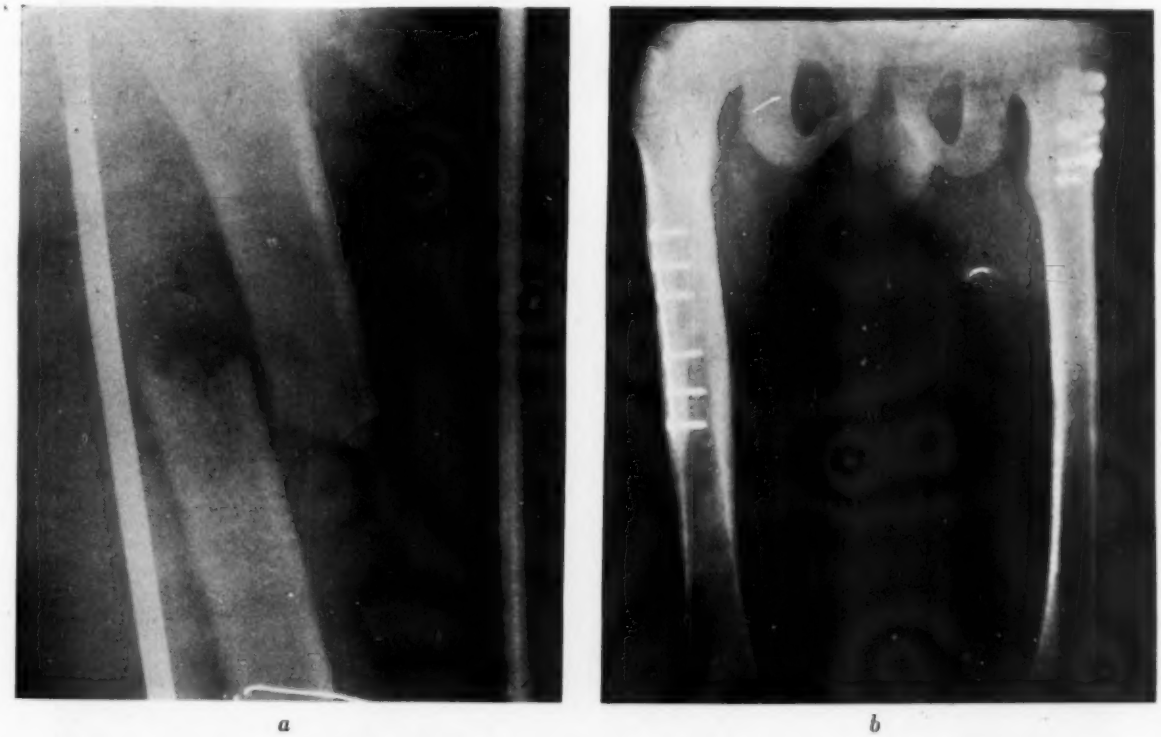
March 9 for removal of the plate. On March 14, when she was dismissed from observation, function and position were normal (Fig. 1).

a *b*

Fig. 6. Fracture of neck of left femur: *a*, before reduction; *b*, after reduction.

Case II. This patient fell on December 21, 1923, and broke the right humerus in the middle third. Her local physician tried to reduce the fracture but was unable to maintain reduction. After three unsuccessful attempts she was brought to the Clinic, and on December 31 open reduction was done with a six-screw Sherman plate. Convalescence was uneventful. The patient left the hospital on January 17, 1924, to continue physiotherapy at the Clinic. When she was dismissed from observation on February 8, function and position were perfect (Fig. 2).

Case III. A boy, aged seventeen, fell on February 18, 1919, and struck the left elbow. Both condyles of the left humerus were fractured. On February 22 open reduction was done. One bolt was passed through both condyles of the left humerus. Convalescence was



a *b*

Fig. 7. Fracture of middle third of right femur: *a*, before reduction; *b*, after reduction.

a *b*

FIG. 8. Fracture of lower third of right femur: *a*, before reduction; *b*, after reduction.

a *b*

FIG. 9. Transverse fracture of left patella: *a*, before reduction; *b*, after reduction.

uneventful. On March 5 he left the hospital and came to the Clinic for physiotherapy, and on April 7 he was dismissed from observation with normal function and position (Fig. 3).

Case IV. A man, aged thirty, was injured in a motorcyle accident on April 16, 1927. He sustained oblique fracture of the upper end of the ulna, including the olecranon, from the shaft of the left ulna. It was impossible to maintain approximation of the fragments because of swelling and interposed tissue. On April 26 open reduction was done; one Sherman screw was transfixed through the fragment to the shaft. Convalescence was uneventful. On May 6 the patient left the hospital and came to the Clinic for physiotherapy. He was dismissed with normal function and position (Fig. 4).

Case V. A woman, aged twenty-seven, fell down stairs on May 4, 1922, and fractured both bones of the left forearm. Because of swelling, position could not be maintained. On May 17 open reduction was done and a four-screw Sherman plate applied to the radius; the region of the ulna was not opened. Convalescence was uneventful. On June 7 the patient left the hospital and came to the Clinic for physiotherapy. When she was dismissed from observation on July 26 there was good function and position of the radius, and fair position of the ulna (Fig. 5).

Case VI. A woman, aged seventy-one, fell on the ice on February 6, 1916, and injured the left hip and fractured the neck of the left femur. Open reduction was done on February 14; the neck of the femur was nailed through the greater trochanter to the head of the femur. Convalescence was uneventful. She left the hospital on June 8, walking; function was normal and there was no shortening (Fig. 6).

Case VII. A boy, aged eight, in an automobile accident on September 4, 1924, fractured the middle third of the right femur. Open reduction was done on September 18, and a four-screw Sherman plate applied. Convalescence was uneventful. He left the hospital on October 3 and came to the Clinic for physiotherapy. By November 13 he was dismissed from observation with normal function and position (Fig. 7).

Case VIII. A girl, aged eleven, was struck by an automobile on July 23, 1924, and fractured the lower third of the right femur. Two attempts at reduction under the fluoroscope were unsuccessful. Open reduction was done on August 7, and a six-screw Sherman plate was applied. Convalescence was uneventful. The patient left the hospital on September 17, to continue physiotherapy at the Clinic. She was dismissed from observation on December 10 with normal function and position (Fig. 8).

Case IX. A man, aged fifty-five, fell on April 12, 1923, while crossing a railroad track and struck his left knee on the rail. He sustained transverse fracture of the left patella. Open reduction was done on April 14, and the patella was sutured. Convalescence was uneventful. He left the hospital on June 27 and came to the Clinic for physiotherapy. He was dismissed from observation on July 10 with good position and 95 per cent function; there was about 5 per cent limitation in extension (Fig. 9).

CONCLUSIONS

From the results of our series of cases of open reduction it may be concluded that:

1. The open reduction with proper armamentarium and technique is no more dangerous than ordinary laparotomy.
2. It is less painful.
3. There is more certainty of the patient's returning to his former occupation.
4. The patient returns to his work sooner than when the closed method is used.
5. There is less likelihood of the development of extensive callus, pain, and disability.

CASES SELECTED FOR TREATMENT

Bone	Fractures			
	Upper Third	Middle Third	Lower Third	Total
Humerus	4	12	10	26
Radius	0	2	3	5
Radius and ulna	0	10	6	16
Ulna	8	3	0	11
Femur	3	16	7	26
Tibia	0	2	3	5
Tibia and fibula	0	4	12	16
Clavicle	..	..	..	10
Patella	..	..	..	7
Total	..	..	..	122

6. It is easier to obtain correct approximation, better weight-bearing, and function.

7. Open reduction is favorable to early manipulation and motion.

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DIAPHRAGMATIC HERNIA

REPORT OF THREE CASES

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A REVIEW of the literature on diaphragmatic hernia prior to 1920 gives the impression that the presence of abdominal viscera in the thorax is relatively infrequent. Giffin found that 650 cases had been reported previous to 1912; most of these were discovered at necropsy, a few were revealed during exploratory laparotomy, and in a small percentage clinical diagnosis was made during life. Fifty-seven cases were reported in the literature from 1912 to 1920, most of which were revealed at necropsy.

Since 1920, however, interest in diaphragmatic hernia has increased and about 1000 cases have been diagnosed and reported. An increasing percentage of diagnoses is being made during life. The literature in 1923 and 1924 became so voluminous that today in making a screen examination of the chest or gastrointestinal tract this once supposedly rare condition is routinely looked for. No longer are isolated cases reported as rare and interesting, but rather discussions of treatment and brief records of clinical observations form the bulk of the material on the subject. Diaphragmatic hernia, however, is of unusual occurrence; Carman, in his report of 17 cases, estimated the frequency as 1 in 18,000.

Recognition of diaphragmatic hernia will be more frequent if there is cooperation between the clinician and the roentgenologist, since the symptoms, when present at all, are usually vague and indeterminate. In a review of the available reports of cases it was found that a diagnosis was made roentgenologically in about 90 per cent of cases reported since 1912. If it is remembered that diaphragmatic hernia may roentgenologically simulate pneumothorax, hydrothorax, lung abscess, bronchiectasis, eventration of the diaphragm or diverticulum of the esophagus, confusion in diagnosis will be greatly reduced. Another difficulty, both clinically and roentgenologically, is that hernia is sometimes intermittently recurrent, especially the congenital type, and may not appear at the time of examination. If the hernial sac contains only solid viscera, the diagnosis is increasingly difficult.

Hernia of the diaphragm is classified as congenital and acquired, true and false. True congenital hernia is the most common. The herniated viscus, according to several writers, may be any or all of the organs in the abdominal cavity. Mayes reported the case of a child whose thorax contained the omentum, stomach, spleen, pancreas, left kidney, colon and part of the duodenum, jejunum, and ileum. There was also dextrocardia. Similar to Mayes's case is one reported by Hess. The abdominal organs usually found protruding through the diaphragmatic opening are, in the order of their frequency, the stomach, colon, omentum, small intestine and spleen.

Diaphragmatic hernia may be the result of congenital enlargement of normal openings in the diaphragm, trauma, short esophagus, or final rupture of an eventrated diaphragm. Congenital deficiency of the diaphragm occurs most commonly on the left side. In one case diagnosed at necropsy there was no diaphragm on the left side, and in another the diaphragm was not united to the posterior wall on the left side.

The symptoms in the clinical history which were most common in the cases reviewed are referable to the chest: distress,

gurgling, precardial pain, and dyspnea. In a large group of patients there are also the symptoms referable to the gastrointestinal tract: pain, distress, burning or fullness in the upper portion of the abdomen, nausea and vomiting after meals with relief from distress, flatus and eructation, pyrosis, mild dyspepsia and weak stomach. Other suggestive symptoms are abdominal cramps with constipation, difficulty in swallowing food, and a cough which is usually non-productive. Hematemesis has also been reported as a symptom. The common physical findings are referable to the chest: gurgling or splashing, usually on the left side; tympany or dullness, depending on whether or not the herniated organ is solid; distant breath sounds over part of the chest; diminished expansion and difficulty in percussing the heart. Absence of Litten's sign is frequently mentioned in the literature.

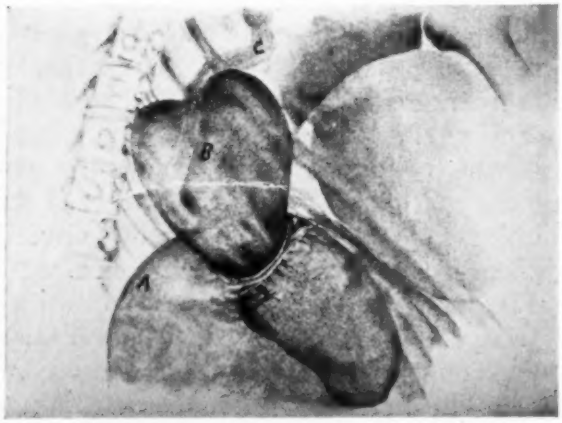

Fig. 1. Semischematic oblique view of stomach as seen on the screen: *a*, left portion of diaphragm; *b*, proximal third of stomach in thorax; *c*, esophagus.

Treatment is entirely surgical. Although the operative mortality is high (33.5 per cent, according to Hedblom), the probability of fatal complications in uncorrected hernia justifies surgical interference.

REPORT OF CASES

Case 1. A man, aged fifty-four, came to the Jackson Clinic on January 16, 1924, complaining of gas and burning in the stomach with considerable distress, mainly in the epigastrium and left hypochondrium, with onset two or three hours after eating. These attacks at times had occurred during the night, and had become more severe during the past month or two. Constipation was marked.

In 1896 the patient had had typhoid fever, and in 1919 influenza. He complained of having had a little stomach trouble for ten years; occasionally during this time he had had epigastric distress in the daytime without relation to meals, and a bad taste in the mouth when he arose in the morning, sometimes with belching of sour gastric content. Four years previously he had been confined to bed with an attack of intense pain, most severe in the left hypochondrium, accompanied by marked jaundice. At that time a diagnosis of cholecystitis had been made. The attack had subsided in about two weeks.

Physical examination revealed nothing of importance. The patient's height was 5 feet 10 inches, and his weight normal, 170 pounds. The systolic blood pressure was 158 and the diastolic 100; the pulse rate and temperature were normal. Occult blood was found on gastroanalysis and the patient was referred for roentgenologic study.

By vertical screen inspection of the thorax and abdomen the diaphragm and other visible structures were identified, but nothing suggestive of a lesion was noted. When the barium emulsion began to pass down the esophagus, its shadow was seen to form in considerable size above the diaphragm and was superimposed on the silhouette of the heart. A brilliant area, like a gas bubble, appeared above the level of the accumulated barium mixture. At first sight this suggested marked dilatation of the esophagus. The meal passed slowly below the diaphragm, revealing a normal outline of the distal half of the stomach; alternate dark and light vertical shadows were interpreted as gastric rugae in the field above the diaphragm from which the accumulated barium was passing. The patient was rotated to the oblique position and additional barium mixture was given. The esophagus was then seen to be somewhat tortuous, not dilated, and to empty immediately above the diaphragm into the gas-filled area already mentioned (Fig. 1). With the patient in this position, the opaque area above the diaphragm was observed to communicate with the shadow of the stomach below by a constricted channel about 6 cm. in diameter. In a short time the stomach became more dependent and was

dentified below the diaphragm. Horizontal, dorsoventral screen examination showed the stomach in normal relation. The patient was then rotated to the back, and the shadow began to reappear above the diaphragm. After some manipulation, much of the stomach was pushed into the thorax through what appeared to be a large circular opening. A normal duodenal cap was visualized, and subsequent examination revealed that the colon and other recognizable abdominal viscera were normal. Diagnosis was made of intermittent hernia of part of the stomach into the thorax through an enlarged opening in the diaphragm at the site of the esophageal ring.

After roentgenologic examination, the personal history and results of physical examination were again carefully reviewed with the aim of obtaining a history of diaphragmatic hernia. It was learned that in 1919 the patient fell to the ground from a scaffold 14 feet high, and landed on the head and shoulder. He was dazed, but no injury was noted, and no particular attention was paid to the fall. Soon after this accident a gurgling sound was noticed in the lower portion of the chest with some pain and fullness, principally on the left. It was after the fall that the attacks of nausea with occasional vomiting began. It was noted further that assuming various positions in bed gave distress, the greatest comfort being afforded when the patient lay on the left side. Also, when he turned over in bed the intestines moved about in the abdomen in such a way that some relief was obtained.

Careful percussion of the abdomen and thorax elicited no unusual tympany, but auscultation disclosed gurgling over an area above and to the left of the ensisternum when the patient was rotated from side to side, and when upward pressure was applied to the left hypochondrium.

Case II. A feeble man, aged seventy-nine, came to the Clinic on April 7, 1926, complaining of nausea and vomiting accompanied by cramp-like pains in the abdomen. This nausea and vomiting had come in spells every two or three months for a great many years, sometimes lasting six or seven days. During the attack he was unable to retain for more than a few minutes anything that he ate or drank. The patient had never vomited any blood. He complained of chronic constipation all his life which was relieved only by purgatives. He had been bothered considerably by asthma and had a chronic non-productive cough. During these attacks the asthma and the accompanying cough became worse, and he would lose from 10 to 18 pounds, but would regain most of it before another attack. During the month preceding examination he had lost 18 pounds. I saw him in remission, during which time he had regained about 8 pounds. During the remission he was physically well but was suffering some depression occasioned by dread that another attack might come on at any time.

Physical examination, gastroanalysis, urinalysis and blood test revealed nothing abnormal, and the Wassermann reaction was negative.

The patient was referred to the roentgenologic department for examination of the stomach. Fluoroscopic survey of the chest revealed a peculiarly brilliant limited area at the right base that could scarcely have been taken for anything but a loop of abdominal viscera. Barium was administered orally and the stomach was seen to fill without event. Its lumen and that of the duodenum were found to be normal and had no relation to the luminous area at the right base previously noted. The patient was seen again in six hours when the head of the meal was approaching the cecum, the major part being in the distal loop of the ileum. In a twenty-four-hour fluoroscopic observation the barium mixture was found scattered throughout the colon except for a segment of the hepatic flexure and the proximal transverse colon. At this time purgatives were administered and the patient was directed to return in two days for a study of the colon by clysma.

On introduction of the clysma the colon filled without event until the clysma approached the hepatic flexure; then the patient complained of cramp-like pains, nausea, vomiting and dizziness. The barium mixture after a few moments' hesitation was seen to pass above the diaphragm (Fig. 2), then downward again, filling the remaining portion of the colon. But during the last part of the procedure the patient was overcome by a fit of coughing which made it impossible for him to cooperate further in the examination.

We are able to conclude fairly accurately that the frequent attacks of gastrointestinal turmoil

were occasioned by intermittent herniation of a loop of the colon, apparently the hepatic flexure, into the thorax. It was not possible to determine by what route this viscus had passed above the diaphragm, nor were we able to learn whether or not the condition was congenital or acquired. However, we are of the opinion that it was congenital, although the early history of the complaint is rather vague in the mind of the patient.

The conclusions of the internist are quoted from the chart: "If he were a younger man we would advise an exploration, but in view of his age and the fact that the attacks come but a few times a year we feel that it would be advisable for him to get along the best way he can and put up with the attacks whenever they occur. I see no way of avoiding these attacks, as the cause is purely mechanical."

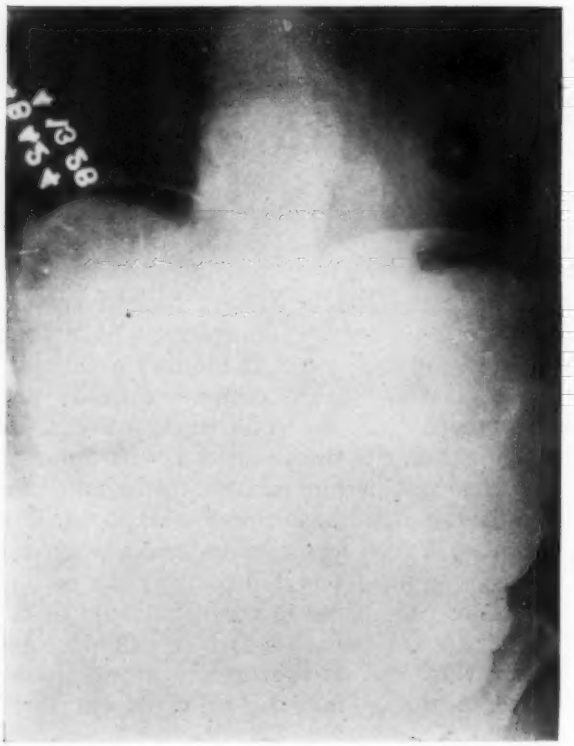

Fig. 2. Hepatic flexure of colon seen at right base above diaphragm.

Case III. A man, aged thirty-five, brought to the hospital on October 23, 1925, was in a semiconscious condition. Two hours previously he had been driving a Ford truck on the highway at a high rate of speed when he hit loose gravel and lost control of the car, which overturned, pinning him under it. When the patient arrived at the hospital he was paralyzed from the hips down and was in considerable shock. The condition of shock was overcome by intravenous administration of glucose and insulin, and his general condition appeared good. Except for bruises on the back and thighs, and paralysis of the lower extremities, physical examination revealed nothing of importance.

Roentgenologic examination revealed a comminuted fracture of the 1st lumbar vertebra with conspicuous displacement of fragments; fractures of the left transverse processes of the 1st, 2nd, 3rd, and 4th lumbar vertebrae, and fractures of the 7th, 8th, and 9th ribs on the left side without displacement of fragments. At the left base of the thorax there appeared an oblong gas-filled area, 7 by 12 cm., the upper level of which was at the seventh interspace posteriorly, extending downward and communicating through the diaphragm, with a corresponding shadow in the abdomen in the approximate location of the stomach (Fig. 3). This was interpreted as being a part of the stomach in the left base of the thoracic cavity. Under local anesthesia and gas, decompression

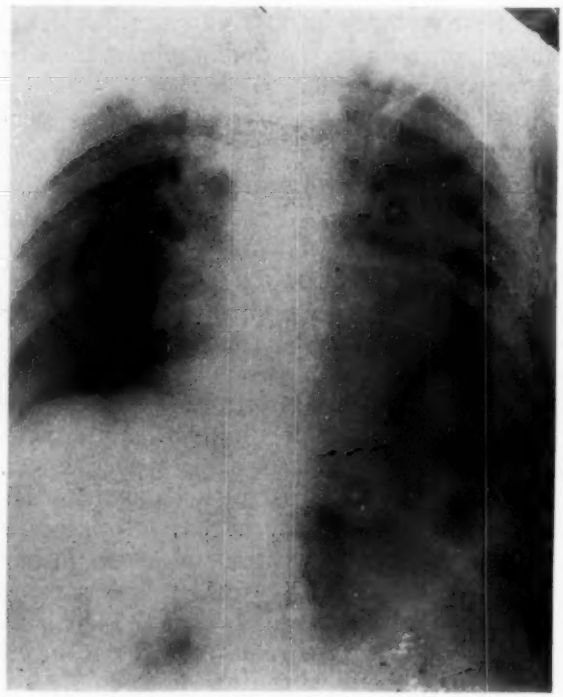

Fig. 3. Upper half of stomach shown at left base above the diaphragm.

was performed on the cord at the level of the 1st lumbar vertebra; during this operation the patient's condition remained good. About twenty minutes after the completion of the decompression the patient again went into shock and died soon thereafter.

Permission for necropsy was granted but was withdrawn before much had been accomplished. It was found, however, through abdominal approach, that there was a rent in the posterior aspect of the left portion of the diaphragm through which had passed a large portion of the stomach.

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MULTIPLE ADENOMA OF THE THYROID WITH GLYCOSURIA

REPORT OF A CASE

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THE importance of coordination between medical and surgical management is well recognized in a case presenting several conditions which require and are amenable to treatment. I wish to report a case in which glycosuria in the presence of mildly toxic goiter disappeared on removal of the goiter and return of the metabolic rate to normal. The hypertension, with high pulse pressure, the edema noted on admission, the marked tonsillar sepsis, as well as the evidence of cholecystic disease, are also notable features of the case.

REPORT OF CASE

A woman, aged fifty-three, was first seen in the Clinic on June 15, 1927. The past history was uneventful, except for yearly attacks of tonsillitis, and an attack of acute arthritis in the right knee four years previously. Her chief complaints were shortness of breath, weakness, and loss of weight (from 220 to 188 pounds in a year's time). Six weeks before admission she had had an attack of acute bronchitis; dyspnea with irregular heart action had been noted for about two weeks, and for a few days only she had noted swelling of the limbs. Glycosuria had been noted by the family physician three or four weeks previously and he had instituted qualitative carbohydrate restriction.

On examination the patient appeared rather obese; the ankles were moderately edematous. The systolic blood pressure was 160, the diastolic 58, and the pulse rate was 116, notably irregular. The thyroid gland was irregular in shape, firm in consistency, and quite prominent. There was moderate hypertrophy of the heart. The tonsils were large and septic and there was fairly definite tenderness over the region of the gall bladder.

Urinalysis revealed sugar, Grade 3, specific gravity 1.029, no albumin or acetone. The blood sugar was 165 mg. for each 100 c.c. of blood. Hemoglobin was 80 per cent; the erythrocytes numbered 5,460,000, and the leucocytes 8000. The patient went to the hospital at once for management of the glycosuria and regulation of the heart's action. During the preoperative period the average systolic blood pressure was about 170 and the diastolic 74. A summary of the trend of the glycosuria during the period of observation is given in the accompanying table.

On June 24, tonsillectomy was performed by Dr. Barlow. By June 30, the basal metabolic rate was plus 27 per cent, and the patients' weight was 170 pounds. At this time she was allowed to return home on a maintenance diet of diabetic type and 6 units of insulin twice daily was prescribed. On July 13, when she returned, no sugar was noted, but the systolic blood pressure persisted at 180 and the diastolic at 86. The period at home was uneventful save for a one-day attack of colicky pain in the region of the gall bladder.

Thyroidectomy on July 18 was performed by Dr. Arnold S. Jackson. Postoperatively insulin was given and only traces of acetone in the urine appeared, although for several days considerable amounts of glucose appeared in the urine, the maximal amount being 51 gm. in one twenty-four-hour specimen, and the next highest 29 gm. During the immediate postoperative period she was routinely given 6 units of insulin twice daily in addition to 200 c.c. orange juice, 20 gm. glucose, and 20 units of insulin together, several times when it seemed indicated. On July 20 the temperature rose suddenly to 104°F. with signs of consolidation at the bases of the lungs; however, by July 23 the temperature had returned to normal and the signs had cleared. Convalescence then continued without event. By the end of July the systolic blood pressure

TREND OF GLYCOSURIA IN PATIENT WITH HYPERTHYROIDISM

Date, 1927	Pulse rate	Blood pressure		Weight, pounds	Basal metabolic rate	Temperature, degrees F.	Diet				Glucose available, gm.	Insulin, units	Natural tolerance	Blood sugar, per cent	Glucose in urine, gm.	Acetone	Remarks
		Systolic	Diastolic				Carbohydrates, gm.	Proteins, gm.	Fats, gm.	Calories							
6/15	116	160	58	188	.....	.....	...	..	...	.....	...	.....	...	0.165	Grade 3	–	
6/18	..	...	..	...	.....	.....	100	50	100	1,500	139	.....	...	.....	12	–	
6/21	80	170	74	...	.....	.....	100	50	100	1,500	...	6 twice daily	...	.....	11	+	
6/24	..	...	..	...	.....	.....	...	..	...	.....	.....	.....	...	.....	..	.....	Tonsillectomy
6/25	92	180	80	...	.....	.....	78	50	120	1,592							
6/28	..	...	..	...	.....	.....	...	..	...	.....	...	6 twice daily	...	.....	6	+	
6/30	..	...	..	170	+27 per cent												
7/15	72	154	64	...	.....	.....	90	50	120	1,640	131						
7/16	..	...	..	...	.....	.....	...	...	...	.....	...	6 twice daily	...	0.160	Trace	Trace	
7/18	..	...	..	...	.....	.....	...	..	...	.....	...	12	...	....	..	Trace	Thyroidectomy
7/19	..	...	..	...	.....	.....	80 liquids	12	10	458	88	.....	...	.....	29		
7/20	..	...	..	...	.....	104.6	80 soft, liquid	19	46	810	103	18 in 3 doses	16	.....	51	.....	Extra-endogenous metabolism
7/21	..	...	..	...	.....	.....	168	33	93	1,641	182	58 divided	46	.....	24	–	Pneumonia
7/24	..	...	..	...	.....	99.4	102	37	87	1,339	131	12	95	.....	12	Slight trace	
7/25	..	...	..	...	.....	.....	122	40	110	1,638	156	16 in 2 doses	116	.....	8	Slight trace	
7/30	84	140	76	...	.....	.....	100	50	125	1,725	141	20 in 2 doses	101		–	–	
8/9	80	150	80	...	.....	.....	100	50	125	1,723	...	18 in 2 doses			–	–	
8/10	..	...	..	...	.....	.....	...	...	...	.....	...	18 at home	...	.....	..	.....	Dismissed from hospital
8/11	..	...	..	159	+3 per cent	.....	...	...	...	.....	...	.....	...	0.117	..	–	
8/25	..	...	..	...	.....	.....	...	...	...	.....	...	2 at home			–	–	
9/9	..	...	..	...	.....	.....	...	...	...	.....	...	2 at home			–	–	
9/21	..	..	..	..	.....	Qualitative carbohydrate restriction						.....			–	–	

was 140, the diastolic 76, and the general appearance of the patient was much improved. No glycosuria was noted during the remainder of her stay in the hospital, which terminated on August 9, although she was still receiving two 6-unit doses of insulin daily at this time.

By August 11 the basal metabolic rate was plus 3 per cent and the weight 159 pounds. On August 25 she returned to the Clinic and a twenty-four-hour specimen of urine was sugar free. She was, therefore, permitted to return home on qualitative carbohydrate restriction only and no insulin. On September 6 and again September 21 the twenty-four-hour specimens of urine were sugar free; the systolic blood pressure was 150 and the diastolic 80, and the general sense of well-being good.

The association of glycosuria with hyperthyroidism is, of course, not new, and the work of such men as Fitz, Joslin, and Wilder is of special interest in this connection. Fitz reported a number of cases of diabetes combined with non-toxic goiter in which the goiter had no influence on the course of the diabetes, a conclusion confirmed by Wilder in a review of more than 50 additional cases. The rare incidence of diabetes combined with hyperthyroidism, compared to the incidence of either condition alone,[3] does not uphold the view that hyperthyroidism can initiate diabetes in a person not predisposed to it.

But there seems no doubt that hyperthyroidism can greatly aggravate an already existing diabetes. A number of facts seem to support this view: (1) Administration of thyroid extract has been known to provoke glycosuria (alimentary?) in supposedly normal persons, and when it is given in cases of frank diabetes the glycosuria is greatly aggravated. (2) When the intensity of the hyperthyroidism is reduced by the giving of iodine, the intensity of the glycosuria is greatly reduced. (3) Conversely, in periods of exacerbation of the hyperthyroidism in the combined cases, glycosuria is greatly increased. (4) Following thyroidectomy the glucose tolerance in such cases is greatly improved. (5) In the event of postoperative myxedema in such a case, the sugar tolerance may return practically to normal. These phenomena have been best explained[1,2,3] on the basis of variation in the metabolic rate. This explanation is in harmony with the fact that increase in the metabolic rate stimulated by high-protein feeding (explained in this case by the high specific dynamic action of protein), by fever or by pregnancy, produces decreased carbohydrate metabolism.

Certain facts regarding the relation of hyperthyroidism and diabetes have been emphasized by Joslin: (1) The increased metabolism of hyperthyroidism is just as harmful to patients with diabetes as overeating of food, and is more likely to lead to coma, since the endogenous overeating goes on day and night, whereas the exogenous overeating is confined to a few meals a day. (2) Surgery in the presence of hyperthyroidism and diabetes is necessarily attended with certain hazards, but if one adheres to procedures now well recognized he may expect to succeed. (This author cites a case in which, as can well be imagined, some seven specialists cooperated in a single day.) (3) There are certain similarities between hyperthyroidism and diabetes: each leads to overeating and in turn to emaciation; there is association in both of red cheeks with weakness, indicating a high protein destruction; if uncontrolled, the metabolism in each case runs too high; if over-controlled, as by the removal of too much thyroid or extreme undernutrition, the metabolism runs too low.

In the case reported it is presumed that the glycosuria was probably the result of true, though mild, diabetes, probably of arteriosclerotic origin, activated by the coexisting hyperthyroidism. That insulin is less efficient in the presence of a high metabolic rate is roughly illustrated in this case by the improvement of the natural tolerance with the subsidence of the fever and toxicity of the thyroid. Since during the first day or two postoperatively it was difficult to maintain an adequate caloric intake to meet the basal requirements, much of the glycosuria must have been of endogenous origin. The increased glucose tolerance postoperatively is therefore to be explained on the basis of reduction in the metabolic rate and increase in the efficiency of the patient's own natural insulin, rather than on the basis of any special improvement in the condition of the diabetes itself or of pancreatic function.

SUMMARY

A case is reported of a patient past middle life presenting arteriosclerosis and toxic goiter with associated cardiac insufficiency, tonsillar and gall-bladder sepsis, and glycosuria. On removal of the tonsils and thyroid her general condition was greatly improved, and the glycosuria disappeared, probably as a result of the decreased load on the patient's metabolism, with resulting greater efficiency in the natural supply of pancreatic hormone.

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A NEW BONE-HOLDING CLAMP

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A NEW bone-holding clamp has been devised, with the object of providing an instrument by which the two sections of a long bone may be accurately aligned and held in the properly aligned position until the plaster cast becomes hardened. The majority of bone clamps used heretofore have consisted of two separate clamping elements which were not connected, and during the various means of applying retentive dressings, the ends of the bones would slip and overriding take place.

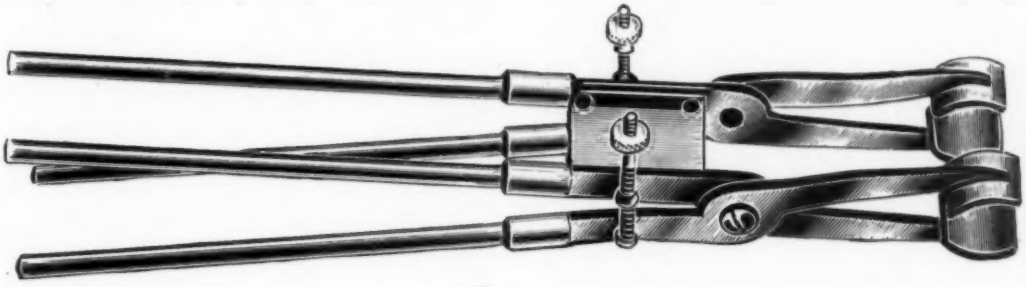

FIG. 1.

The method with this new clamp is particularly satisfactory in that the personal equation in the holding of the severed ends of bones together is largely eliminated, and replaced by a surer mechanical device. In the present instrument, two clamps are really made a part of a single appliance. They are individually adjustable to engage the two sections of bones to be aligned; but means is also provided for the accurate locking of the two clamps against any relative movement after they have been applied.

In Figure 1 is seen a drawing of the clamp as it is now being modified by the manufacturer. With the proper use of this bone clamp, I believe that bone grafting operations upon the long bones, wiring and plating, bone bands and other operative procedures may eventually be entirely eliminated.

Cases of true non-union of bone are comparatively rare, the most frequent being the intracapsular fracture of the femur. The lower third of the tibia is next in order of frequency. The principal cause of non-union in the latter type of fracture is lack of blood supply, whereas in the intracapsular type, non-union occurs through faulty reduction or the interposition of muscle or fascia. Syphilis for years was given as the cause of non-union, but this condition can now be disregarded.

In fractures of the long bones, especially those of the lower extremity, I believe that if 25 per cent of the fractured surfaces is in apposition, a good functional result will ensue with the proper weight-bearing capacity. As we gain further experience and skill in the reduction of fractures by the open method, we aim more and more to simplify the operative procedure, and avoid leaving any foreign substance in the wound. The Parham and Martin bands have given excellent results in the past in oblique fractures, especially of the femur, but they present the difficulty of constricting the periosteum in its entirety, and the secondary removal is somewhat difficult.

The use of bone transplant has met with success, but I believe that the results

obtained were due to the open reduction, the clearing of debris from between the fractured ends of bone and the perfect approximation of bone fragments, rather than to any holding quality of the bone graft or its ability to proliferate new bone.

With the hope of eliminating all foreign substances remaining in the wound, I have devised this instrument for holding the ends in place while the plaster is being applied. The clamp itself consists of a body with projecting arms, removable handles, and a fixing or tightening apparatus to retain the clamp in place after the fragments are properly aligned. The arms are inserted along the posterior surface and the fixation nuts are screwed down, retaining the fragments in place. The handles can be removed by one turn clockwise and a projecting metal cover placed over the entire device, including the dressing. This cover varies in size and shape with the length of the incision. For the purpose I have used an empty ½ lb. soda bicarbonate container. The plaster of Paris dressing is then applied to the entire limb, including the cover. When hardening of the cast occurs, the plaster is cut about the cover device, the handles reinserted in the clamp, and the clamp removed from the wound.

If this bone-holding clamp and method of procedure are properly used, I feel that simplification and improvement in the treatment of bone fractures will result.

HEAD TILTING AND TURNING OF OCULAR ORIGIN*

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HEAD tilting of ocular origin was first described, according to Bielschowsky, by Cuignet in 1871, and more fully described by Landolt in 1890. Since then much has been written and many cases reported. Much that has been written has, from all appearances, been copied from previous works and is not the result of personal observations.

FIG. 1.

FIG. 2.

FIGS. 1 and 2. The head tilt most frequently seen, compensating a paralysis of the superior rectus muscle, either congenital or acquired; in both cases shown the origin is congenital.

Whitman's textbook on Orthopedic Surgery describes ocular torticollis as an improper attitude of the head rather than a torticollis, and classes it with the acquired forms of torticollis. It is true that in only one of the large number of cases observed was a true torticollis, with the contracted sternomastoid, associated with an ocular paralysis that would probably have caused the head to tilt in the same direction. Which element was the primary lesion we were never able to prove; but from the infrequency of this finding, we believe that they were two independent congenital anomalies or lesions acquired in early life.

The act of head tilting seems to be a combination of visual and neuromuscular impulses. There is every evidence that the desire for binocular single vision is a strong

* Read before the Section of Orthopedic Surgery, New York Academy of Medicine, October 21, 1927. This paper was illustrated by 75 lantern slides showing various head tilts and the muscles involved, with the field of diplopia before and after operation; a few plates are here reproduced.

impulse. There are many cases, however, where with one eye markedly amblyopic, or, in one case, without even light perception, the head tilt was the same as that resulting in binocular single vision. There seems here to be no other explanation but that of muscle sense.

From earliest childhood there is a strong aversion to any misalignment of the visual axes. This is seen in babies a few months old who keep one eye shut much of the time or who hold the eye shut with their fists. This condition of monoblepsia is quite frequently seen in adults as well as in infants.

There are two conditions causing head turning that should be mentioned in passing; the first is that present in some cases of nystagmus. Here the head is turned so as to put the eyes in the field of the slower component. The second condition is the head tilt not infrequently seen in uncorrected cases of high astigmatism. The tilting here seems to result in somewhat better vision.

The torticollis due to ocular muscle paralysis is the variety most frequently seen.

Fig. 3.

Fig. 4.

Fig. 3. Congenital paralysis of both the superior rectus and inferior oblique muscles of the right eye. The head is tilted back to enable use of the eyes in the lower field, where the patient has single binocular vision.

Fig. 4. Head tilt compensating a paralysis of the right superior oblique.

All of these cases were corrected by operative intervention, either wholly or nearly so; operative interference seems to give the most satisfactory results in the majority of all of these cases.

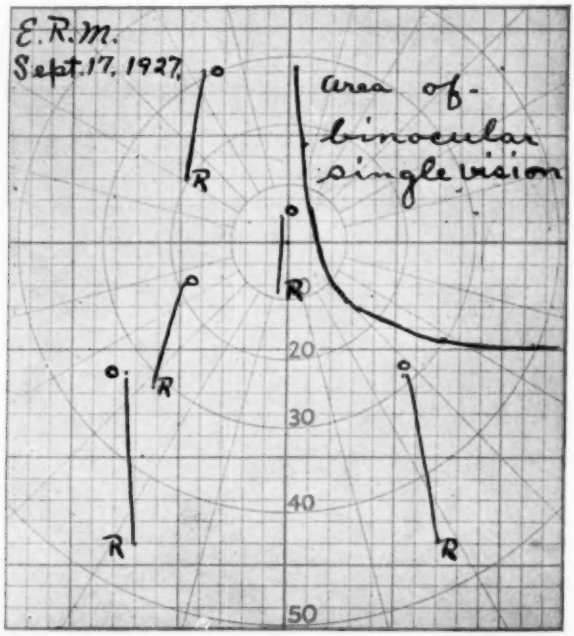

Fig. 5. Diplopia chart in a case of head tilting due to a paralysis of the left superior rectus. The head was turned so that the area of binocular single vision was used when looking straight ahead and slightly down.

Lateral curvature is not infrequently found in cases of true ocular torticollis, and it is to determine the presence of any tendency to this that the ophthalmologist should seek the aid of the orthopedist. The shoulder on the side toward which the head is tilted is frequently lower than the other, and definite histories of this condition being noted by tailors and dressmakers are commonly obtainable.

The ophthalmological arguments of the cause of head tilts are not of especial interest to orthopedists. The general rule applying to the lateral rotators is that the head is turned toward the field in which

the paralyzed muscle should work. So, in the case of paralysis of the right external rectus or left internal rectus, the head is turned to the right, and in a paralysis of the left external rectus or the right internal rectus, the head is turned to the left. There seems to be no exception to this rule.

The usual rule regarding elevators and depressors is that in right hand elevators and depressors, namely, the right superior rectus and right inferior rectus, the left superior oblique and left inferior oblique, the head is turned to the right; and in left hand elevators and depressors, namely, the right superior oblique and right inferior oblique, the left superior rectus and left inferior rectus, the head is turned to the left. There are so many exceptions to this rule, however, with such definite proof to substantiate them, that this is not a safe rule to follow.

The head is usually tilted back in a paralysis of an elevator, thus putting the eye in the field of the depressors. The reverse is true when a depressor is paralyzed. Whether the head tilts to the right side or to the left side do not depend on whether the muscle is a right side or left side elevator, as formerly stated, nor does it depend on the torsion effect of the muscles. The study of many of these cases gives every evidence that the head is tilted toward the side of the higher image. For example, if the right superior rectus is paralyzed, the image seen with the right eye will be the higher. Now if this is associated with an homonymous diplopia, the head will be tilted to the right shoulder. If, however, there is present a crossed diplopia, the head will be tilted to the opposite shoulder.

Occasionally is seen a paralysis of the same elevator or depressor in each eye. This is usually congenital and results in a head tilt only when one muscle is more paretic than its fellow. Not infrequently the head is not only tilted to one shoulder, but may be turned to the right or left, and tilted either forward or backward, thus being turned in three different planes.

The treatment of these cases by the ophthalmologist consists in either the use of prisms, or in some operative intervention. Cases of low degree of vertical deviation are at times relieved by prisms, while the higher degrees require an advancement of the paretic muscle or muscles, a tenotomy of the overacting muscle or muscles, or some combination of these procedures. Some cases are better left alone to continue their head tilt. This can usually be determined by carefully studying the case as to fusion sense and diplopia fields.

As causative factors of muscle paralysis, syphilis is the most common, although not in the proportion once claimed. Epidemic encephalitis, anterior poliomyelitis, diphtheria and many toxic conditions are frequently found to be the cause. Some are of traumatic origin. Many are congenital and are divided into two groups: (1) those resulting from an anomalous condition of the muscle itself; and (2) those due to anomalies of the ocular motor nuclei.

Cases of ocular torticollis are much more frequently seen than is usually supposed and require the combined attention of both the ophthalmologist and the orthopedist.

CASE REPORTS

TWO CASES OF OBSCURE GONEITIS*

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DETROIT

WE have recently been required to diagnose and treat two instances of disorder of the knee joint which have been rather unusual, and set each other off in interesting contrast. For instance, while both patients are women, one is about twenty, and the other nearly four times that age. The younger patient came to us after a complaint of years, the older with a duration of months only. In the younger woman a previous diagnosis of tuberculosis, quite consistent with her age, had been overruled; but in the aged patient, despite her years, we have entertained and substantiated a diagnosis of tuberculosis.

Considering the older patient first, we have a woman of seventy, whose past life had been rather uneventful medically and of no particular bearing on her present complaint, although she admitted spells of lumbago and occasional mild stiffness and lameness in the joints. She boasted of a "strong constitution" and had held to an unusually active life in spite of her years, until this illness. Even the latter had not seemed to have any appreciable effect on her general well-being, until the last few months.

About eighteen months before entry, her left knee began to be a little lame after activity and soon to be a little swollen. The symptoms gradually have progressed in degree since then, with an increasing limp; but pain has been constant only lately; there has been no recognized deformity, and complete disability has lasted only a few weeks prior to entry. During this period, she has felt run-down generally and lost some weight.

She entered the hospital at the instigation of her son, on account of this knee disability, and was admitted to the medical In-Patient Department for study, being referred to this division a few days later with tentative diagnosis of infectious arthritis. The roentgen-ray diagnosis had seemed to support the clinical one. The films show some possible bone changes which Dr. Doub or I might characterize as slightly suggestive of infectious arthritis; in other words, probably a normal knee for her age (and the same is true of our second case). However, the films do show a very considerable tumefaction of the soft parts, as well as increased density of them, which is of considerable significance, especially that noticed posteriorly.

On examining this knee clinically, I was inclined to make a positive diagnosis of tuberculosis. The basis of this is partly instinctive and hard to describe; but of course, there should be certain criteria if this is to be a scientific diagnosis. There is something about the feeling of the joint that is different, and this gives us our strongest impression. In appearance the knee was held in about 20° of flexion and was obviously enlarged, particularly on its medial and anterior aspects. The skin appeared thin, shiny, and a little waxy, but pale or dusky rather than red, and showed obvious multiplication and enlargement of the visible superficial veins. Quite marked local heat was present to palpation, and possibly fluctuation also,

* From the Henry Ford Hospital. Presented at a regular Hospital Staff conference.

although the patella was not floating. More important was a feeling of doughy, gummy thickening of the periarticular tissues, which followed closely the synovial areas. Tenderness was marked and corresponded to this thickening, front and back. The knee, with pain, could be extended 10° more, and flexed to 45°. Muscular protection was obvious. There was visible and measurable atrophy of the thigh and a very slight enlargement of the calf. The femoral and inguinal glands were slightly larger on this side, but not tender. Temperature and W.B.C. were normal. The chest was negative to clinical and roentgen ray examination, and the woman's general condition found to be quite good.

Inasmuch as the course, the age, and the roentgen ray (to which we are in this disease, however, constantly giving less importance) were against our diagnosis, I recommended an exploratory incision under local anesthesia for purposes of a biopsy. This was done as soon as the patient was transferred to our service, and not only did we encounter a typical edematous jelly-like synovial membrane, but also caseation and pus. The frozen sections were full of tubercles.

Now the treatment of a major joint in which the presence of tuberculosis can be proved is arthrodesis, certainly in an adult. This is the only way that a cure is ever effected, and it is doubtful if a permanent cure with preservation of the joint function has ever been secured in a proved case. However, arthrodesis means a prolonged convalescence, with a considerable period in bed, even in a healthy young adult. The time element or the certainty of such a result in the elderly we thought was too speculative, and the operation itself a rather severe one. The principal needs of this old lady were relief from pain, comfort and a short period of convalescence. We therefore recommended amputation.

This was done the next day under spinal anesthesia. There was no shock. The patient did not miss breakfast, lunch or supper, and could sit up and take fluids from the start. She was allowed up in a week, and in two weeks started using the stump in a temporary plaster and peg leg prosthesis. The stump flaps were made atypical in their construction, long posteriorly and short anteriorly. This was to conserve the greatest possible length of femur and still keep the anterior incision above the upper limits of the quadriceps bursa.

We have the gross specimen of the joint here, though it is much cut up. It is interesting in that we first thought we had another case of pure synovial tuberculosis, which incidentally we have come to realize as a definite possibility even after some years' duration. However, there was found a small area of cavitation in the center of the tibia with a much smaller point of erosion through the cartilage into the joint, indicating an extension from bone rather than into bone.

Our second case is less rigidly susceptible of proof as to diagnosis. This twenty-year-old girl was sent to us from another state by a former patient. Her family history is negative for tuberculosis, but she has a sister in a hospital with some kind of nervous trouble. Her past history is good, and shows nothing of note, save chronic constipation.

Three years ago, she states, her left knee began to be swollen and painful, and after a few weeks she was unable to use it. After various forms of treatment by different doctors, a diagnosis of tuberculosis was made; and about two months after onset an arthrodesis operation was performed that was successful, with no more symptoms in this knee. Two years ago she developed a similar complaint in the right knee, and she states that pain in this knee has prevented any movement of the joint since that time. For a year she got around with crutches, but for the past year has been confined to her room and only able to take a few steps. A year ago, after roentgen ray examination, a diagnosis of tuberculosis was made in this knee, and the same

operation recommended, but not accepted. In the meantime, various forms of rheumatic treatments and serums have been without effect. Casts have also been tried. About three months ago she states she had pain and swelling in the ankle on the same side.

She was admitted on our service on April 19, with a cast on the right leg. This extended only a few inches above the joint and permitted 10° to 15° movement of the knee. When the cast was removed, she would not allow any motion whatever in the knee. The ankle was very slightly swollen but this disappeared after removal of the cast. Movement of the ankle seemed to be considerably limited by pain and muscular protection, but otherwise this joint was entirely negative to examination. The right knee also was entirely negative to physical examination, save for the limitation of motion, the knee being maintained in the completely extended position. There was nothing visible to inspection, no local heat, no enlargement or palpable thickening. There was some general atrophy of the limb but no distinctive atrophy of the thigh. The left knee seemed solid in the completely extended position, but the patella was freely movable to palpation and to reflex contraction of the quadriceps.

Roentgen rays were made of both knees. The left showed fusion of femur and tibia, obviously operative, but no sign of bone pathology, and normal preservation of the chondral area under the patella. The right knee I would consider in the films essentially normal, save for some generalized increased radiability from disuse.

The diagnosis made was hysterical arthropathy of all these joints. A low-grade arthritis would of course be hard to rule out on findings, but with the findings would be inadequate to explain the disability. Remember that according to the patient's statements she has been unable to bend the right knee for two years, and that her family bear this out.

Further to evaluate the status in this right knee, we examined it about a week ago under spinal anesthesia. We particularly wished to determine the question of adhesions or other evidence of intra-articular pathology. When anesthesia occurred and the knee was picked up, it at once flexed nearly 45°, without any audible or palpable tearing or giving way of adhesions. The quadriceps became rather taut, but further flexion gradually occurred from the weight of the leg and finally a little pressure brought about an angle of 90°, still without anything apparent happening in the joint. The ankle seemed entirely free and normal.

The knee was splinted in not quite as much flexion, and the reaction awaited with considerable interest. There was no reaction. This knee, said to have remained extended for two years, and presumably the seat of some articular disease during this time, had now been abruptly flexed 90°; yet there followed no swelling, no effusion, no local heat or redness. Neither was the patient particularly uncomfortable, although on account of considerable obvious tension on the unused quadriceps a little codeine and aspirin were given the first day. Massage was started on the second day and well tolerated, with a little passive motion. At this time the patient would unconsciously move her knee to assist us in adjusting the splint. On the fourth day she started self-aided active motions, that is, with a sling and pulley counteracting the gravity effect of the leg; and when examined recently, showed a self-obtained range of motion of 45.° I am interested to know just what will be the patient's reactions psychically.

I am quite convinced myself of the diagnosis, but not quite as much so as to the form of psychotherapy now required. So far we are working simply on the physical effects of disuse.

In conclusion, then, we have one knee disorder in which a serious lesion, incapable of responding to conservative treatment, yet not likely to be suspected in a patient of such an age or with such roentgen-ray

findings, was found by exploratory operation; and a second knee disorder in which the clinical symptoms had elsewhere led to a diagnosis of tuberculosis, but which turned out to be most probably on a neurotic fixation basis. At this time I might reiterate the proposition that I have previously been putting forth to you that chronic disorder of the major joints can frequently not be diagnosed accurately even by symptomatology, physical findings or roentgen ray findings, and that an incision for biopsy may prevent a great waste of time and useless treatment.

INFECTED MYOMA UTERI

A REPORT OF THREE CASES, WITH REMARKS ON RED REGENERATION*

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BY red degeneration, we mean that form of necrosis or necrobiosis, as it is sometimes called, which converts the ordinary hard fibromyoma into a softer, fleshier mass, the change being accompanied by a reddish or other discoloration which results from the hemolytic action of excess lipoids. This red necrosis is an aseptic process, with hemolysis and tissue autolysis, bacteria being present in those few cases which undergo suppuration, the infection being secondary to the degenerative process. There is no round cell infiltration, whereas in infected cases, where it should be present, it is not marked. Infection is not only singularly rare, but is wholly incidental, and stands in no relation to the cause of the degeneration. The proximity in the cervix and vagina of hemolytic bacteria does not alter this conclusion, nor does it seem to favor the theory that such bacteria can gain access to the affected myoma through these channels.

The typical hard fibroma, on cross section, presents a white, glistening, satin-like, whorled appearance, which, along with its distinct and well-marked encapsulation and its contrast with the surrounding reddish myometrium, is striking and characteristic. Equally striking is the appearance of a uterine myoma undergoing red degeneration or necrobiosis. This change usually affects only one tumor, even if others are present, and generally a large-sized one. Rarely are two or more so affected. The differing tumor is soft in consistency, has a well-marked capsule, is conspicuously colored in red, mahogany, yellow or grey, and is loose textured. In most cases, its appearance is that of raw beef, or of the pink color of Tennessee marble. The extent of the necrosis is variable, sometimes in foci, sometimes in streaks, and at times only about the periphery, the pigmentation fading toward the center and leaving a grey nucleus. Necrotic tumors are usually interstitial, though at times partially submucous, and occasionally subperitoneal. Pedunculated tumors are not subject to this pathology, even though twisting and strangulation take place.

Red degeneration was first described by Gebhard in 1899, but it was not until 1903 that particular attention was given it, when Fairbairn published his essay on its etiology, pathology and treatment. While

* From the gynecological services of Dr. T. H. Cherry and Dr. S. DiPalma at the Harlem Hospital in New York City. Read at the N. Y. Academy of Medicine, Section Obstetrics and Gynecology, on October 25, 1927.

an extensive literature has since appeared, little new has been added to his original contribution.

It is acceptable that the colors result from a diffusion of blood pigment through the tissues after hemolysis has taken place, yet the true nature of the pigments are not explained, since the products of such change, namely hemolysis, are not found in the specimens. Hemosiderin cannot be demonstrated by the Prussian blue test, thus eliminating the presence of free iron, and in only one instance have I read of the demonstration by spectrum analysis of hemoglobin.

Strongly favoring the theory of hemolysis is the presence in these specimens of an excess of lipoids, which we know to be highly destructive to blood tissue. This action, however, is usually checked by the normal blood plasma, unless the lipoids are in excess, and thus there can be assumed the presence in the specimen of blood pigments. These lipoids are specifically considered the cause of thrombosis, and thrombosis, by infection or compression, is to some observers a plausible cause of degeneration. The acute onset in these cases would naturally draw attention to a sudden stoppage of the arterial supply, especially when we consider the rather scanty vasculature, arteries that are thin-walled and not communicating with the vessels of the myometrium, and subject to pressure by impaction or crowding, as in pregnancy. It is often noted that intramural fibroids lie loosely in their beds and that large spaces are present between them and the surrounding musculature. This peculiarity affords a plausible basis for disturbed circulation, as in the uterine contractions incident to menstruation, pregnancy and following trauma, for there is a sort of rotary motion of the fibroid within its non-extensible capsule much like that of a mass of dough or putty moulded in the palms of compressing and slowly rotating hands.

While there is a distinct association of lipoids with degeneration, yet the former is not the cause of the latter; and while pregnancy is here supposed to offer a clue to its presence in excess, a number of reported cases were not pregnant. The lipoids are responsible for the hemolysis, and are in excess in the tissues only after the degeneration has taken place, thus facilitating the diffusion of the pigments. In other words, the degenerated tissue favors the acceptance of the hemolyzed blood. It is the continued action of these lipoids in excess of inactivating blood plasma which is accountable for the various hues noticed on section.

The presence of thrombi is not typical, nor can they be proven or surmised to be primary, for degeneration can occur without them and the extent of thrombosis is not proportionate to the amount of degeneration. If the degeneration is presumed to be primary, it is reasonable to presume also that hemolysis induces a deposit of fibrin in a vessel already disintegrated, the thrombus thus appearing secondarily. In the infected cases, however, it is really difficult to deny that thrombi therein arising are the primary factor in the necrosis, the process being similar to others elsewhere in the body.

As to frequency of occurrence, degeneration is found as often as 5 to 7 times in every 100 cases, the pregnant ones in the majority by far. Suppuration in these tumors is conspicuously infrequent, Kelly and Cullen reporting only 11 in 1428 cases, and Deaver saw his first case in 1920 after over 1200 hysterectomies.

Bacteria reported as found are colon, staphylo and streptococci. Gonnococcus is not reported in a single instance. The demonstration of the bacteria in tissue stains is a very difficult attainment, and cultures of tumor tissue are usually sterile also. The case of Dr. H. Vineberg, reported in 1912, is a notable exception to these remarks.

The symptoms usually associated with the onset of degeneration are pain, localized tenderness and a noticeable increase in the size of tumors already known to be

present. The pain may not be severe, though with tumors on the right side, associated as the condition is with a leucocytosis, an appendicitis is incorrectly diagnosed. The acute onset, with definite peritoneal irritation, may mislead the observer into diagnosing such simulating conditions as twisted ovarian cysts and strangulated hernias. A toxic phase with nausea and vomiting accompanies the suppurating types.

Red degeneration as such cannot be distinguished microscopically from necrosis in general, since the discoloration simply accompanies but does not alter the pathological features. The extent of the changes is determined by the appearance of the cell nuclei, the reaction of the cytoplasm to certain stains, the substitution for the muscle cells of hyaline and granular material and the presence of fatty substance. Round cell infiltration is not present (Figs. 3 and 4), which emphasizes the non-infectious nature of the trouble. Fibrin and endothelial debris are found in the blood and lymph capillaries. The tumors are decidedly avascular. A rare variety of fibroid, described by Virchow and called the angeomatous type, shows a large number of thin-walled blood vessels. Two such cases are reported in the English literature. A satisfactory summary of the pathological features is the following, by Lockyear: (1) irregular and scanty nuclear staining (nuclear 'ghosts' at times); (2) granular and hyaline degeneration; (3) replacement of muscle cells by fatty tissue; (4) endothelial shedding, thrombi and deposits of fibrin; and (5) rarely, pus formation after infection.

It would appear that the treatment of this condition is myomectomy or hysteromyomectomy, and yet the opinion is stressed by a number of observers, that with the complication of pregnancy, the patient should and can be tided over until such time as an elective cesarian or myomectomy can be done, or be carried through what might in all respects be a fairly normal labor. It is believed that most myomata, even low down, will, with advancing gestation, rise out of the pelvis and not be obstructive, and that their proper treatment can be satisfactorily conducted near or after full term.

The prognosis, in operation, is uniformly good, and should be no different from the surgery of undegenerated cases. Quite a few cases are recorded of myomectomy in the course of a pregnancy without resulting miscarriage or abortion. However, in the infected cases, mortality is unfortunately very high, ranging from 27 per cent in Kelly's estimate to 50 per cent in Basso's and 70 per cent in Berger's. These high figures would make it most important that operation be undertaken early in the degeneration, before infection, if indeed such diagnostic acumen could be applied. In a patient known to have myoma, a sudden attack of localized pain and tenderness and a definite increase in the size of the tumor should lead one to the diagnosis of degeneration; the advent of toxic symptoms, associated as it would be with peritoneal irritation, high temperature and leucocytosis, should establish the diagnosis of bacterial invasion. One of our three cases (Case 11) was correctly foreseen.

SUMMARY

Degeneration of fibroids is associated with the presence of lipoids, the accumulation of which may be dependent on the presence and extent of thrombosis or infection. Infection is never primary. The hemolytic action of the lipoids is restrained by the blood plasma, excess of lipoids giving a red discoloration, and by its continued action, the red being replaced by deeper hues; and finally, in extensive changes, by a grey color. As degeneration can occur without color changes, a better term would be simply, "Degeneration," or, "Degeneration with red or brown or grey discoloration," whatever the color happens to be. The hard consistency of some of these tumors may give no indication, exteriorly, of the changes noted on section or microscopy. Thrombosis is not

thought to be primary and is not always present; in infection, it is likely to be primary. The microscopy is characterized by the presence of hyaline and granular degeneration, replacing or separating the muscle fibers remaining by the presence of fat and karyolysis. The presence of fat is singular and probably results from muscle fiber change. There is no round cell infiltration. Pregnancy is a predisposing factor. Infection gives rise to toxic symptoms and is fatal; early operation, with no resulting infection, can be successful. Operation in degenerated fibroids is indicated, except in such cases complicated by pregnancy where temporizing until full term may happily result.

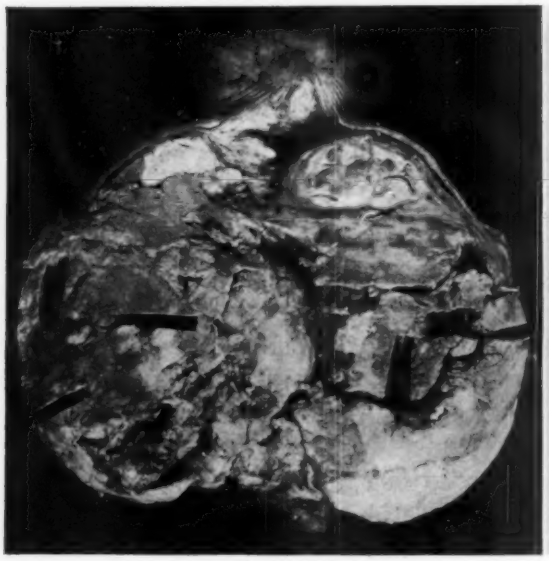

Fig. 1a.

Fig. 1b.

Below is reported a case that prompted this brief study, followed by two others, one of which (Case II) was correctly diagnosed before operation, and the other was an accidental find in a patient operated on for bilateral adnexal suppuration.

CASE REPORTS

Case I. L. G., forty-three years old, colored, married. Entered Harlem Hospital on June 13, 1927, complaining of pain in lower abdomen and appearance of a mass, increasing in size, and not known to her to have been present before this sudden illness. Typhoid and pneumonia two years ago. Has had two children and two miscarriages. Menses began at thirteen, were regular and continued from 3 to 5 days, rather more profuse the past two years, and for the past two months accompanied by pre-, per- and postmenstrual pain. The pains were of a bearing-down character, felt in the lower abdomen and also in the back. Her present illness began two weeks ago, with onset of regular menses, rather more than usual pain in the lower abdomen and back, occasional chilly feeling, and a noticeable increase in the size of the abdomen, within which she herself was able to make out a mass of which she was not previously cognizant. She 'did not feel at all well,' had nausea and vomited once. In spite of her last menses having passed only ten days prior to admission, she was still thought to be pregnant, and sought hospitalization, owing to her peculiarly sick condition.

On admission, she looked acutely ill, with temperature 100°, W.B.C. 15,400, polymorphonuclears 78 per cent. The Wassermann was negative. The patient was well developed and well nourished, and exhibited abdomenally a globular mass, hard, freely movable, painful and tender, reaching up to within the umbilicus. Vaginally, two other fibroids were made out. A provisional diagnosis of ovarian cyst and twisted pedicle was made and operation

advised; this advice was not accepted; three days thereafter, temperature went to 103, and again on the fifth day to 105. Operation was then undertaken, on June 21, 1927, eight days after admission. The specimen shown (Fig. 1) was removed, by supracervical hysterectomy, leaving both the adnexa. In preparing the uterus for removal, it was lifted out of the pelvis with a cork-screw. Not suspecting trouble ahead, the operation proceeded and was speedily finished. Unaware of what was waiting, the specimen was sectioned

Fig. 2.

Fig. 3.

in an unsterile fashion, and to our great surprise, a quantity of pus flowed away, and the red fibroid was noted. No smear was taken at this time. The fibroid so affected was the largest of thirteen, and about the size of a large orange. The fluid had a fishy odor, the capsule was well defined, though loosely attached in places, with minute clots of blood appearing in the loose areas. The consistency was hard, the color that of washed meat. The pathology present was that described above, and is shown in Figures 3 and 4. A contrast with an ordinary fibroid is offered in Figure 2. For the relief of paralytic ileus, an enterostomy was performed on the fourth day, and huge quantities of pus were taken from the much-distended small intestine. The patient died on the morning of the fifth day postoperative, cultures from the peritoneum showing pure colon bacillus.

Case II. S. J., aged thirty-seven, operated upon at Harlem Hospital on June 24, 1927. She was about seven months pregnant (fourth gravidity) and gave the history of sudden illness about three weeks ago with severe abdominal pain, frequent vomiting, occasional high fever, and a definite history of a chill. Of significance is the fact that at the beginning of her illness, though not subsequently, she noticed an abnormal development in the size of her pregnancy, and complained especially of pain in the left upper quadrant. The pain was severe, almost constant, giving the patient, who was an unusually robust and pain-enduring type, the appearance of acute severe illness. Temperature on admission was 104, pulse 90 to 100, leucocytes, 16,200, polynuclears 82 per cent and lymphocytes 16 per cent. A small, hard, tender mass was palpable, attached to and movable with the uterus, situated at the site of acutest tenderness, namely, at the fundus of the enlarged uterus, at the left.

At operation, on the day following admission (June 24, 1927), the tumor was found as outlined, surrounded by recent adhesions which held down the neighboring intestines and omentum; these adhesions separated, the mass shelled out and proper closure was affected. The patient never seemed to be able to throw off the septic phase she presented before operation, her robustness evidently no match

for the toxemia with which she was coping. She miscarried on the tenth day postoperative, and died on the twelfth day.

On section the tumor, the size and shape of an egg, was rather soft, grayish in color and had at its center a small cavity, containing a sanguinous pus without special odor. The pathologist's report follows:

"The wall of the cavity is shaggy and wrinkled, and of a grey, opaque tissue, similar to that which appears, in shreds, in the cavity. No thrombi visible. Microscopically, a section

Fig. 4.

of the cavity wall shows the muscle fibers poorly stained and in general pycnotic and fragmented; moderate amount of edema separating the fibers. Between the muscle bundles and muscle fibers, one finds a considerable number of fairly well-preserved and also much fragmented polymorphonuclear neutrophiles, and nuclear debris. These materials occur in ill-defined patches that are generally distributed throughout the specimen, always apparently paralleling the direction of the muscle fibers, and more noticeable near the central edge of the section. A section removed from the outer wall revealed muscle fibers poorly stained, showing either no nuclei (the more usual phase) or the veriest shadow of a large, oval, very vascular nucleus. The fibers were small, the ends rounded or frayed, striations very indistinct. A very moderate polynuclear leucocytic intermuscular infiltration was present. In neither of the sections examined were any vessels thrombosed, thickened or narrowed."

Case III. A. L., aged twenty-five, operated upon at the Harlem Hospital on May 2, 1927, for bilateral adnexal suppuration and multiple small fibroids of the uterus. There was no hint in the history that she was having any trouble in the uterus, the symptoms pointing entirely to the adnexa, from which she had suffered on a previous occasion. She was not considered especially ill, and was operated upon at a selected time, twelve days after admission.

One of the fibroids contained pus, the smear of which was negative, though the culture showed staphylococcus albus. There was no discoloration. The patient got well, and was discharged on May 15, 1927.

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PSEUDO-PANCREATIC CYST

WITH REPORT OF TWO CASES

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IN the daily hospital rounds, the discovery of a patient who presents an upper abdominal tumor seems at once to arouse general interest and to provoke more than the usual discussion as to the diagnosis of the condition. Kidney, spleen, liver and gastrointestinal tract are promptly brought under suspicion; less commonly, perhaps, is the pancreas in itself thought to have any association with the pathological picture. If we can only keep in mind, however, that such a tumor mass may be the result of some lesion of the pancreas, a true appreciation of the case may be more easily reached. Because of the general interest, therefore, in upper abdominal tumors, and the comparative infrequency of pseudo-pancreatic cysts, as well as the fact that a clear conception of just what these cysts are is not always held, a brief review of the subject, with the presentation of the cases here reported, seems justified.

What, then, is a so-called pseudo-pancreatic cyst? As Moynihan states, the term "pancreatic cyst" is applied to any fluid tumor within the pancreas or "associated with it." The retention cysts of the pancreas, the proliferation cysts (cystic adenomas and carcinoma), the congenital, the hemorrhagic cysts, the hydatids and dermoids comprise the true cysts of the pancreas and are all contained within the substance of the gland itself. The pseudo-cysts, on the contrary, are not within the pancreas, but are usually included in any discussion of the true cysts because of their "association" with it. They arise, it is now generally believed, as the result of a laceration of the gland accompanied by an extravasation of fluid into the lesser peritoneal cavity which the cystic mass then occupies. Cathart describes the process as follows: "An injury causes a laceration of the gland. This is followed by an extravasation of blood and with this is mixed the pancreatic secretion from the torn ducts. Not only is a constantly increasing fluid thus added to the original hematoma but the collection of fluid probably becomes irritating in character. It would thus tend to excite the formation of a capsule around it, and by chemical irritation and tension would gradually increase in size." Such a cyst, therefore, is seen to be merely a collection of fluid within the lesser peritoneal cavity, and to be associated with the pancreas only in so far as it originated from an injury to that organ.

The first case of this sort reported in the literature was Kuklenkampff's in 1882, and was thought to be a true cyst, along with several others reported at this time. Jordan Lloyd was probably the first to recognize the true pathological picture and from his study drew the conclusion that they were of traumatic origin, were merely fluid accumulations within the lesser sac, and could not rightly be considered as true cysts of the pancreas.

A consideration of the position of the gland as it lies across the body of the first lumbar vertebra, with a complete absence of fat in the tissue between it and the parietal peritoneum, even in fleshy people, makes it clear that it is not completely protected from injury. Particularly when the stomach and transverse colon are empty, the pancreas may be crushed between an external force and the body of the vertebra, and the parietal peritoneum covering it being particularly adherent, it is easily torn. Arising behind the stomach, the collection of fluid, as it increases in size, gradually forces that organ forward, pushing it upward usually, and to the right. As a rule it makes its way between the stomach above and the transverse

colon below, its area of dullness on percussion usually being surrounded by the tympany heard over those organs. Occasionally, however, it presents above the stomach or below the colon, frequently displacing them to a considerable extent, as shown in the roentgen-ray examination or at operation.

The diagnosis of pseudo-pancreatic cyst is sometimes confusing at first, especially as the mass seems at times to vary in size or even apparently to disappear. This, however, is due to the varying degrees of distension of the stomach or colon, these organs when distended with food or gas accentuating the appearance of abnormal swelling in the upper abdomen, and again when collapsed minimizing it. The history of the case, however, is usually of decided value. It almost always reveals some previous trauma to the upper abdomen, a blow or kick, or a crushing injury as from the passage of a wheel over the abdomen. This trauma may have been slight, with only transient disability, or it may have presented all the signs of serious intra-abdominal injury, with collapse, pain, vomiting, rapid pulse and other evidence of intra-abdominal hemorrhage, with rigidity, tenderness and leucocytosis. If the case has been unassociated with injury to other viscera, however, which might otherwise compel immediate intervention, these symptoms may gradually subside, so that under conservative treatment the patient may appear to have completely recovered and even be discharged from observation.

Usually within a month, however, there may be a return of symptoms, a recurrence of pain which may be severe, and a gradual and sometimes rapid appearance of a tumor mass in the upper abdomen. Vomiting, general restlessness and constipation are common and dyspnea, anemia and an unduly rapid loss of strength frequently follow. The tumor mass may appreciably increase in size day by day. It is characteristic in shape and usually lies in the left hypochondrium or in the epigastrium. It may extend even into the umbilical region, however. Its area of dullness is not continuous with that of the liver or spleen as a rule, but is surrounded by a zone of tympany due to its relation to the hollow viscera.

Thus, with a history of trauma, the development of symptoms as outlined above, and finally the appearance of the characteristic tumor, the diagnosis of pseudo-pancreatic cyst should be clear. There are several conditions, however, for which it may at times be mistaken. A left-sided hydronephrosis may present many of the features of a pseudo-pancreatic cyst; but by means of cystoscopy with ureter catheterization and roentgen-ray, a differentiation between the two is expected. Hemorrhagic cysts of the spleen do not as a rule extend so far to the right; a subdiaphragmatic abscess runs a febrile course with a blood picture indicative of suppuration, and the roentgen ray as a rule shows a greater elevation of the diaphragm. With an ecchinococcus cyst of the liver there is no surrounding zone of tympany and the characteristic crepitation of the daughter-cysts, if elicited, will dissipate all doubt. An ovarian cyst should be differentiated by its greater mobility, by the more diffuse swelling and usually lower position. An abscess of the abdominal wall, aside from the evidence of suppuration, fails to displace the abdominal organs and is naturally more superficial. Other retroperitoneal tumors lack the history common to pseudo-pancreatic cysts and usually the sense of fluctuation also. From true cysts of the pancreas itself, however, a differentiation is sometimes almost impossible; both may occupy the same region, both may be of a similar shape and consistency, with identical physical signs. Even at operation the diagnosis may not be certain. Examination of the cystic contents itself cannot be relied upon to differentiate the two conditions, as the presence of sugar-reducing and fat-splitting enzymes of the pancreas may at times be demonstrated in both. If a section of the wall of the cyst, however,

is removed for microscopic study, the distinction can be made, for only in the case of the true cyst will a lining of columnar epithelium be found.

The treatment first attempted in connection with pseudo-pancreatic cysts was aspiration of its contents. This met with such disaster, however, through rapid and fatal peritonitis from leakage of the fluid into the general peritoneal cavity, if not from accidental perforation of the hollow viscera, that it was quickly abandoned. Extirpation of the cyst, partial or complete, met with somewhat more favorable results, but soon gave way to simple incision with drainage and marsupialization of the sac. This has been found to be highly satisfactory and has now long been the recognized treatment for the condition. The following tabulation from Godel, who collected 227 cases, shows the value of marsupialization in these cases.

		Cures	Deaths	Mortality, Per Cent
Total extirpations.....	28	25	3	10
Partial extirpations....	9	4	5	55
Marsupializations.....	190	183	7	3
Total number of cases	227	212	15	6.5

Kijewski, who collected 240 cases, had similar results, though not so striking:

	Cures	Deaths	Mortality, Per Cent
Total extirpations.....	43	35	8	18
Marsupializations.....	197	174	23	11
Total number of cases	240	209	31	13

Mocquot and Constantini in a series of 88 cases give a mortality of 12.5 per cent, with marsupialization as the only treatment employed.

Ordinarily an anterior abdominal incision is made through the left rectus over the most prominent portion of the mass. As this usually presents through the gastrocolic omentum, the incision may then be carried down in this area until the cyst is encountered. The fluid is then removed by means of an aspirator, the cyst being punctured with a trocar after the general abdominal cavity has been thoroughly protected by suitable pads. After the collapse of the cyst, the perforation in its wall may be somewhat enlarged and a dressed tube inserted and held in place by means of a purse string suture of chromicized catgut. In addition, the cyst wall may be sutured to the parietal peritoneum and the abdomen then closed. There is usually not an excessive amount of drainage, though occasionally a pancreatic fistula may persist. Mocquot and Constantini report such fistulas in 41 of their 88 cases. These all closed, however, within one to three months. For a persistent fistula, these writers suggest injections of astringent solutions, an antidiabetic régime and, if necessary, an anastomosis of the fistulous tract with some portion of the stomach or duodenum. Fistula, however, apparently is not a complication to be dreaded.

Instead of the anterior abdominal incision, Cathcart employs one in the lumbar region, claiming for the posterior incision more favorable drainage, an extraperitoneal approach to the cystic mass and avoidance of risk of postoperative ventral hernia. Such an incision has much to commend it when the diagnosis is well established. If there is any need for exploration, however, the anterior approach is probably preferable.

The following cases here reported were both traumatic in origin and presented many of the features usually found, though they varied somewhat in the severity of the symptoms. The first case was particularly instructive, as it was under observation from the time of the original injury until discharge from the hospital after operation. Both cases responded to simple marsupialization with uneventful recovery.

CASE REPORTS

Case 1. V. B., a litte girl six years of age, was admitted to St. Vincent's Hospital on June 17, 1925, in a state of shock, having been knocked down by an automobile. The wheel, however, had apparently not passed over the abdomen. There were no external evidences of injury to the abdominal wall, no asymmetry of the abdomen, no abnormal dullness, no palpable masses. There was some

epigastric tenderness, however, and slight rigidity, and in view of the shock, together with epigastric pain and vomiting, a tentative diagnosis of internal injury with possible hemorrhage was made. Intervention at that time, however, did not seem indicated and no operation was done.

The little patient came out of her shock, but during the next few days the epigastric pain persisted and in fact became the outstanding symptom throughout her illness. At times it was severe, coming on in exacerbations, gradually to subside. Vomiting also was frequent. Tenderness in the left upper quadrant with muscle spasm most marked in that region was noted on the 19th.

A blood count at this time showed 18,600 W.B.C., with 80 per cent polymorphonuclears. Shifting dullness indicated free fluid within the abdomen, in the general peritoneal cavity. The child's general condition, however, was not yet alarming and there still seemed to be no sufficiently definite indication for operation, and no lead as to the exact pathology. Tenderness, pain and vomiting, however, persisted. Abdominal distension developed, at times marked, at others less noticeable.

Finally, on July 15, twenty-eight days after her injury, the abdomen at this time being only slightly distended, a mass was detected in the epigastrium and left hypochondrium and the signs of fluid within the general abdominal cavity had gone. This mass was obviously a localized collection of fluid, tense and with distinct fluctuation, and it rapidly grew larger in size.

Without a definite diagnosis, though expecting to find a hematoma which had become encapsulated, operation was performed on July 21, and a large pseudo-pancreatic cyst presented through the gastrocolic omentum. The fluid was evacuated and the cyst marsupialized; the fluid was brownish in color, alkaline in reaction, contained numerous red blood cells, but was negative for pancreatic enzymes. The Mayo drain which had been sutured within the sac was removed on the fifth day after operation and a small rubber tube substituted. Drainage was slight. The cavity was occasionally irrigated with Thiersch's solution and later with saline. The child made a good recovery with entire subsidence of symptoms. On the fifth of August the wound was entirely healed and on the seventh the patient was discharged home. Subsequent examinations have shown that there has been no recurrence of symptoms, and that the sinus has remained closed.

Case II. M. B., white female child three years of age, admitted to the hospital May 28, 1926, because of a swelling in the upper abdomen that her parents had noticed. The child had been run over by a wagon on April 13, 1926, the front wheel crushing the abdomen. She had been removed to a hospital where she remained under observation for nine days. A week after her discharge from the hospital a mass was noted in the upper left quadrant, and for this the child was admitted to the Children's Surgical Service at Bellevue Hospital.

There were no particular symptoms at this time, no pain or vomiting, and aside from a distinct anemia, merely the presence of the characteristic swelling with the history of a previous trauma. The mass lay in the left upper quadrant, extending from under the costal border to the umbilicus and to the right slightly beyond the midepigastrium. It measured 10½ by 12 cm., was firm though with a distinct sense of deep fluctuation, dull on percussion and was unaffected by respiratory movements. A surrounding zone of tympany was readily elicited, and with these findings, and the history of abdominal injury, the diagnosis of pseudo-pancreatic cyst was ventured.

At operation on June 1, a large, tense, cystic mass was found to occupy almost the entire upper half of the child's abdomen, effectually preventing much exploration. It arose from behind the stomach, which it was markedly displacing upward and to the right, and was most easily reached through the gastrocolic omentum, the transverse colon being below. Accordingly it was aspirated at this point, almost two quarts of greenish-brown fluid under considerable tension being removed. A Mayo drain was then sutured into the opening made in the cyst and the cyst wall in addition sutured to the parietal peritoneum.

The child made a perfectly smooth recovery with very slight drainage from the wound, the cavity being Dakinized to assist in its obliteration and entirely closing three weeks after operation. Up to the present time this child also has remained well, the operative scar being firmly healed and abdominal examination showing no evidence of a return of the cyst.

In closing I wish to express my gratitude to Dr. S. J. Walsh and to Dr. Carl G. Burdick, directors of the surgical services at St. Vincent's and Bellevue Hospitals respectively, who kindly gave me permission to report these two cases.

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EDITORIALS

A PILGRIMAGE into an unknown field is to be undertaken with trepidation, when a trail has already been blazed in brilliant fashion by a predecessor. It is with a distinct feeling of apprehension that I carry on where Doctor Brickner leaves off.

Everywhere is seen the process of evolution. A journal devoted to surgery is no exception; somewhere in a distant past it rises; it has its dark days; it takes on parts that soon atrophy and die or, in time, become dominant factors in its existence. It passes into new hands. One editor lays down his blue pencil and another picks his up. The individual fades from the picture, but the publication continues life and constantly takes on new aspects.

When one assumes a new editorship, he does so with high hopes of building firmly and high upon the foundations so solidly laid down for him. Feeling that there is a distinct place for THE AMERICAN JOURNAL OF SURGERY in our professional lives, and with a keen desire to fulfill this need to its fullest extent, to make the JOURNAL stand out and become a looked-for essential—these are some of our aims.

But evolution is slow and growth does not reach its fullness overnight. The general type of subject material will continue. New departments may be attempted, a different arrangement of material may be tried, and new features offered for your approbation. The main part of each issue will be composed of original scientific communications. Many articles will be well illustrated. One department will be devoted to case histories; another to the results of bookshelf browsing, followed by a review of the latest books. There will appear regularly a letter from abroad or from the Orient or South America done in a human way and with fairness. Space will be devoted to things of interest to physicians in current lay periodicals, and from time to time a page on the surgical-legal aspect of prob-

lems done by an attorney who knows the subject will be offered. Frequently four to eight articles will be published coming from a recognized surgical clinic or group, or from a group of surgeons from one city or section of the country.

After long debate and deliberation it has been decided to omit abstracts, for the reason that they are so thoroughly done by *Surgery, Gynecology and Obstetrics* and the *Journal of the American Medical Association*. The abstracts in *The American Journal of Roentgenology and Radium Therapy*, also, are the most complete in their field of any journal in the world. To insert abstracts covering but a part of the latest literature, a sort of willy-nilly affair, strikes us as a waste of paper and printer's ink. Perhaps the subscribers to The American Journal of Surgery hold different views. If so, we should be glad to hear them, and to be guided by the replies received.

The American Journal of Surgery is the official organ for a number of scientific bodies. But only papers of the soundest merit read before these organizations will be considered. Discussion will be limited to added information offered. If, in the opinion of the editor, an article stands out more prominently without discussion, such discussion will not be put into type. In other words, it is our aim to strive for originality, to insist upon terseness without lessening interest or sacrificing literary flavor.

Much material is on hand for future issues, but we are on the alert for articles with the stamp of originality and authority. Once an article is accepted early publication is assured.

In time we hope to balance the Journal with two or three articles representing the surgical specialties, and not publish too much along one line.

And so we begin our editorial journey, with eyes on certain fixed stars, a broad trail blazed in the past, with high hopes that suggestions and constructive criticism will come to us from many hands, and that the readers of The American Journal of Surgery will look forward to receiving it each month with interest and delight.—

T. S. W.

BRITISH LETTER

DURING the past year we have been celebrating in England the centenary of the birth of Lord Lister. These celebrations have been held in London, Edinburgh and Glasgow, for in each of these cities he was in active practice and carried out some particular phase in the development of his system of treating wounds. It is pleasing to note that distinguished surgeons all the world over made it their business to attend these functions and some gave addresses recalling one or another aspect of his work. His Majesty the King received the delegates in London at Buckingham Palace. The Prime Minister, Mr. Baldwin, paid tribute to his memory in the great hall of the British Medical Association, and aptly quoted that great ambassador of America, Mr. Bayard, who in proposing Lister's health at a dinner of the Royal Society once said, "My Lord, it is not a profession, it is not a nation, it is humanity itself which, with uncovered head, salutes you."

Short addresses were also made by Professor Henry Hartmann of Paris and Professor Max von Gruber of Munich. It was London's privilege to have another address later by a famous professor of surgery, namely, Professor von Eiselsberg of Vienna, who gave the second Lister memorial lecture at the Royal College of Surgeons of England. Eiselsberg knew Lister personally; when an assistant of Billroth he was sent by his chief to King's College Hospital, London, in order to learn at first hand Lister's methods. The main theme of his discourse developed from the fact that the great progress made in surgery was due to the fundamental work of Lister and his antiseptic system of treating wounds. There were still those, he said, who declared that

Lister had discovered only the antiseptic system and that asepsis was an independent discovery; but in his (Eiselsberg's) view it was quite clear that asepsis was the outcome of the Listerian train of thought. One great drawback to the surgery of today was that the enthusiasm of some surgeons prompted them at times to attempt too much; who on account of the diminution of the field of danger in the undertaking of operations of choice with the modern technique were unable to resist carrying out a stereotyped surgical procedure when without sufficient justification. As a consequence, indifferent and even bad results must follow. Lister, with his lofty principles and his habit of careful investigation, would have been the first to condemn such unnecessary operations. Every step forward in surgery might cost life; therefore before any such step was taken results should be checked by anatomical and physiological research and animal experiment.

Professor von Eiselsberg especially deplored unnecessary operations on the stomach and also in the treatment of fractures. He emphasized the fact that indiscriminate gastroenterostomies had undoubtedly brought many evils in their wake, so that in recent years there had been an outcry against the operation itself, although it is certainly justifiable and useful in particular cases.

There is no comparison between the status of the surgeon of today and that of his predecessor a hundred years ago. In those days if an operation was successful it was due to the forethought of the physician, and if it failed it was owing to the clumsiness of the "barber surgeon." Today the surgeon stands on the same social footing as the physician, and coincident with this rise in status has been the growth of efficiency in the nursing profession. Both now assume greater responsibilities, dependent for a successful issue upon the careful cooperation of the two professions, medicine and nursing.

Many problems are left for the rising generation to solve, more particularly with regard to cancer, a disease which is now being thoroughly investigated on scientific lines. Then there are further therapeutic possibilities indicated by experiments with serum. Some day, perhaps, there will be forthcoming a polyvalent serum which will protect against all pathogenic organisms. If this dream were realized it would greatly simplify all operative precautions. Before medical science could reach its present level an immense amount of plodding work and research had to be gone through, untold nights spent in vigil and numerous sacrifices of pleasure and ease had to be made. The world knows nothing of the silent performance of duty which our profession demands both day and night. What Lister has given to the world should never be forgotten. He introduced a new and truly beneficent age of medicine, and his name and the glory of his work should never be dimmed. His achievements demand our greatest admiration. Great Britain can be justly proud that it is one of her sons whose name will ever be associated with the momentous progress of surgical science in modern times.

Curiously, Sir Berkeley Moynihan in his address "The Approach to Surgery," delivered at King's College Hospital Medical School, covers some of the ground touched on by Professor von Eiselsberg. He says "Surgery is in these days both science and art. As science it accomplishes the purposes for which every science exists: to acquire direct knowledge, to accumulate facts, from a multitude of individual examples to raise a broad truth, to weave generalizations, in its highest accomplishment to link cause and effect . . . As art surgery is incomparable in the beauty of its medium, in the supreme mastery required for its perfect accomplishment and in the issues of life, suffering, and death which it so powerfully controls."

The changes that have taken place in surgery and the great increase in the number, intricacy and scope of operations

have made it far more necessary than ever before that the surgeon should be a skilled craftsman. To practice the craft with something near perfection a man must surrender his whole life. To attain a certain facility in operative work is not difficult; to imitate the master's methods and to follow the movements of his skilled hands is within the easy competence of many. Man, Aristotle tells us, is the most imitative creature in the world, and he learns at first by imitation. It is natural for us all to delight in works of imitation, but in imitation there lies a great danger. Many of the operations of surgery have now become so standardized, so perfected and simplified by a multitude of workers, that they can be imitated by others with a degree of success which, though falling short of the best, is yet, by comparison with the results of a generation ago, worthy of high praise. This has unhappily led to the too frequent performance of operations, and to their performance by those whose judgment has not kept pace with their technical accomplishments. Perhaps the most abused operation in surgery is gastroenterostomy. A distinguished continental surgeon has fathered a paper by one of his pupils on "Gastroenterostomy a Disease." This paper states: "The anastomosis is in all truth a disease in the absence of a sufficient cause or in an inartistic and vicious manner. That it is frequently performed when it is not needed, that it is performed by the clumsy imitator, is certain. Many of us have the bitter duty of undoing such anastomoses or of resecting the ulcer which has developed in consequence of them. The physician who sees such cases condemns the operation: in that, surely, he is wrong; his strictures and ours should not fall upon the operation but upon the operator. I conceive that a duty rests upon the physician greater than he realizes. When a physician for whose talents and devotion I have great respect expressed his regret that he could not agree with my advocacy of surgical treatment for chronic incoercible duodenal ulcer because the mortality of the operation practiced upon his cases was over 10 per cent, I was constrained to say that were the mortality in my own hands so high, I should abandon surgery. The duty rests upon the physician, if he advises operation, to point out that the mortality of operative work varies with the operator; that though in general terms there is an average mortality for every operation, in cases of difficulty or danger, where the fine issues between medicine and surgery must first be decided, and much depends upon experience, the choice of a competent and practiced operator is necessary."

Further he declares: "A change in the training of the surgeon is imminent and is certainly overdue." He believes that the approach to surgery is not as formerly by the study and teaching of descriptive anatomy, which has been for generations the custom of one in this country desiring a post on the surgical staff of a large hospital. His plan would be, to quote his own words: "Were my days to come again I should, after leaving examinations behind, spend the time necessary to make an adequate knowledge of human anatomy my permanent possession, and should then escape to experimental research and in a community of like-minded people, endeavor to train myself for the high destiny of a surgeon, the one man who may engage in direct research. My time would be spent in the laboratory, where a youth of plastic mind may learn the methods of approach to new problems or to new extensions of old problems; where old knowledge is merely an impulse to the search for new; where intellectual dissatisfaction is victor over narrow complacencies; where the religion of research inspires him and equips him for his work in days to come. If surgery is to be something more than a wonderful craft, if it is to be the instrument of research which I believe it to have been, and destined to be in the future, those who practice it must have their minds shaped and strengthened by con-

flict with unsettled problems, not cramped and sterilized by monotonous exercise within a narrow province of static knowledge. Their minds must be trained in the laboratory in analogical research, so that they may be more effectively exercised both in the operation theater and in the wards upon direct research; not, I need hardly say, to the neglect of the dissecting room, but to its relegation to a subordinate position. The comradeship of laboratory workers and clinicians should be intimate and unbroken. The scientist at work in the laboratory can never reap the full reward of his lonely researches without close and loyal collaboration with the clinician. Nor can those who serve the same cause in a different atmosphere give to their patients the best aid of medicine and surgery without the help of the scientist. The training of the surgeon must not only allow, it must urge, his mind to stray beyond the hard boundaries of old knowledge, over the edge of firm beliefs, into wide territories as yet unexplored and even undivined. In this way only is there escape from the danger which besets the surgeon in the future: the peril of a facile automatism."

Much has been written lately and many discussions have taken place in the medical societies with regard to that ever present problem, "Hospital Accommodation and Administration." Papers were read on the subject in the section of Medical Sociology at the Annual Meeting of the British Medical Association in Edinburgh, and created a very interesting discussion. It was quite evident that although a policy has already been propounded and accepted by the Association it by no means satisfies a considerable number of the members of the profession. The gist of the policy is that the system of Voluntary Hospitals should be preserved and that their work should be extended to other than charitable patients; and furthermore that there should be an attempt at coordination of all types of hospitals under the direction of advisory committees so as to avoid overlapping and unnecessary expenditure. We must remember that hospitals in this country originally were solely for the sick poor; this character was maintained practically until about thirty years ago when a few hospitals instituted a small number of paying wards. Since the war, however, there have been undoubtedly greater calls upon the existing institutions, and voluntary subscriptions from the more wealthy people have been decreasing rather than increasing. This is, in part, owing to the inroads made on their incomes by increased taxation, and also because of the claims of the state now made upon them as employers of labor for the compulsory insurance of their employees for accident and for sickness benefits. The hospitals, therefore, have had great difficulties in finding the money necessary for working expenses, and many fall back on assistance from special funds, particularly the King Edward VII Fund presided over by the Prince of Wales. However, most institutions now make good by adopting what is known as Workmen's Contributory Schemes, which imply a weekly collection at the various mills and workshops, where the employees agree to have sums varying from a penny to threepence a week deducted from their wages.

These schemes are generally based on what is known as the Leicester Scheme, the money going to a central fund under the control of a small committee which allocates sums to various hospitals and demands for their subscribers practically free maintenance and treatment. No payments whatever are made to the medical staff of the various institutions, as a rule, from these workmen's collections; consequently there occurs at times the most flagrant abuse of what were formerly charitable establishments and of course usually at the expense of the medical profession.

In his presidential address to the Bath and Bristol Branch of the Association, Mr. Hey-Groves of Bristol has done a great service in challenging the present system on the grounds of inefficiency.

The hospitals are often badly situated and do not lend themselves to suitable alteration and consequently cannot or do not obtain the necessary premises and assistance to undertake modern scientific work. They are sadly short of beds for the number of applicants for admission and therefore the overflow is tending to go to the municipal hospitals where the staffs, though perhaps limited, are certainly paid for the services they render.

The management of the voluntary hospital must maintain the strictest economy to carry on its work and the modern methods of treatment are actually neglected on account of lack of funds. Mr. Hey-Groves instances the growth of radiotherapy and the expense necessarily incurred in its development for laboratories and skilled assistance, and relates that a city of such importance as Bristol with a population of over half a million has as yet secured only 5000 pounds' worth of radium, and still lacks the necessary central laboratories, technical assistance and proper continuous financial support; whereas the same city does not hesitate to spend out of public funds a quarter of a million on the housing of mental defectives.

Mr. Herbert Eason of London, opening the debate on this problem at the Edinburgh meeting in July last, declared himself in favor of an amalgamation of the voluntary and municipal or poor law hospitals under a joint board of management which would control the medical and nursing staffs. He suggests that there should be a common visiting staff for the two hospitals in order to insure a common standard of treatment, but the municipality should pay for the services of the staff at the municipal hospital. This hardly seems a practical proposition, since the two kinds of hospitals will both be used eventually for the whole working class population, and not, as in the past, as charitable institutions for the sick poor.

From the foregoing it is plain there is at present a great confusion of ideas with regard to the policy of the hospitals in this country, and unfortunately there is being developed an iniquitous system which requires and demands highly technical and devoted services from the medical profession, but does not deem these services worthy of any financial remuneration.

John H. Watson, M.D.
Burnley, England.

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[From Fernelius' Universa Medicina, Geneva, 1679.]

BOOKSHELF BROWSING

THE DOCTOR AND HIS BOOKS*

HARVEY CUSHING, M.D.

BOSTON

WE ARE come here today because sixty years ago, as you have heard told, a Cleveland physician of blessed memory, Dr. Isaac N. Himes, took out a subscription for the London *Lancet* and prevailed upon the authorities of the Case Library to accept it as the nucleus for an assemblage of medical journals.

Subscribers to the library at large, on payment of a dollar a year, were entitled to browse at will among its admirable collection of books, but the medical treatises, which soon began to accumulate, were fenced off in a wire enclosure as dangerous to the general reader. So at least it is related; and in part I know it to be true, because once as a small boy I was left outside the enclosure while my father, who had a key to the paddock, got in and became promptly absorbed in the pages of a foreign-looking book.

Left to my own scant devices, I watched the world out of a deep-seated window near-by, an occupation which enables me now to say that the paddock for medical books was in the southwest corner of the second floor of the old "Case Block," for the view commanded what was then the post-office and, beyond, the Public Square. That at all events is my recollection. Still, I have a congenital difficulty in telling, off-hand, the points of the compass, and have no patience with people who instinctively can. To distinguish East from West, I always find it necessary to face an imaginary Lake Erie which is North, and I then know that the sun rises—no, sets—to my left down Prospect Street which must therefore be West.

There is no body of water to serve for Bostonians any such useful purpose. There is no East or West in Boston that I've ever found. The only thing to help you when lost, even if instinct warns you it's the wrong direction, is to go up-hill. You'll surely arrive, however tortuously, at the Hub of the universe where hangs a sacred cod—a place you can't use for anything except as a new point of departure. It's just like attaining the North Pole from which every direction is South.

So when a doctor feels himself lost or astray over some difficult problem, there's just one thing for him to do—to betake himself to a library, a place whence knowledge radiates, there to get a fresh start. And having got ourselves thus properly oriented, we may come back to Dr. Himes and the *Lancet* of 1878 as a point of departure.

* Delivered at the Dedication of The Dudley P. Allen Memorial Medical Library in Cleveland, Ohio, on November 13, 1926, and reprinted by permission of the author from the publications of the Cleveland Medical Library Association.

Great benefactions grow out of similar acorns and many of them start with the gift of a handful of books. Some of our great universities have come from equally modest beginnings, books having proved a surer way of making a proper start than a gift of money. So Yale, for example, was founded:

Each member brought a number of books and presented them to the body; and laying them on the table said these words, or to this effect: "I give these books for the founding of a College in this Colony."

Books are tangible property and their sponsors must not only provide for them but make it possible for others to use them. Money gets dissipated and committees disagree as to how it had best be invested or expended. No such question arises when books are concerned; and the soul of an institution that has any pretense to learning comes to reside in its library, no less than does the soul of a profession or of an individual.

There is a peculiar thing about books, insufficiently emphasized. They are bibliotrophic, one attracting another; for books don't quarrel, only their authors. House them properly and other books will, instinctively, come to the roost. What is more, those of a kind mysteriously flock together. So around Dr. Himes' *Lancet*, other doctor-books assembled themselves. The Cuyahoga County Medical Society, by vote, added to the mischief by apportioning two-thirds of its membership dues to the purchase of more books and journals and soon the Case Library became so embarrassed by the straying of medical tomes from their proper enclosure that the interlopers were "given notice." Appeals for space having been made to the City library without avail, the doctors were thrown upon their own resources.

This is a nigh-invariable happening, and a very good thing 'tis so. The profession cannot long play the cuckoo with its books. It must build its own nest, and care for its own brood. A book-conscience, thereby developed, serves as the best possible measure of the status of the profession. As the calorimeter tells the activity of the patient's metabolism, so may you determine the plus or minus activity of the local profession in any district by the condition of its library. And no less well may one gauge the quality of a medical school, of a hospital, of a laboratory, of the individual doctor himself, by the same standard.

I need not recall to you, who have anxiously taken them, the many steps necessary to provide properly for the collection belonging to the Cleveland profession, which had so modest a beginning. Similar steps, and not always forward ones, have been taken by the doctors in all communities the world over. For the first evidence of solidarity among our fellow-kind, wherever they are found, is the establishment of a library for use in common and from which, as an appropriate and convenient centre, there comes to radiate in due time a host of subsidiary activities. For purposes of comparison with your own experiences, as well as to show what may be in store for you, I will tell briefly the story of the one of them with which I happen to be most familiar, and to which I stand deeply obligated.

At about the time Moses Cleaveland and his party were busily surveying this then distant wilderness, some doctors in Boston, young men mostly in their twenties, organized what was known as The Medical Improvement Society. They met at each other's houses on Thursday evenings to read and discuss medical papers. Incidentally they formed what was known as a "social" library and began to collect books. These at first were deposited at the home of one of the members and subsequently in rooms over an apothecary-shop as a convenient place of meeting. By 1807, according to the first printed catalogue, the library contained 184 volumes, and these soon multiplied beyond the capacity of Apothecaries' Hall to hold them.

Temporary accommodations for the

cumbersome waif were then found in the Medical School which had just moved into new quarters; but books of the sort were not particularly welcome, and doubtless with a sigh of relief the collection, then of some 2000 volumes, was finally transferred to the shelves of a private corporation, resembling the Case Library here, which at the time of its foundation just one hundred years ago absorbed most of the lesser circulating libraries in Boston.

One thing at least was demonstrated by this move—that a general library makes a neglectful step-mother to a strictly professional foundling; and a period of nearly fifty years of inanition ensued. Various medical societies meanwhile came to be established, each with its own indifferent, variously deposited and privately owned lot of books.

This represented the status of the Boston Medical Library when in 1874 a young and energetic doctor of thirty summers, James R. Chadwick, came upon the scene. He was convinced that the several separate accumulations of medical books should become united for the benefit of the whole profession. On his initiative and at about the time Dr. Himes subscribed for that historic copy of the *Lancet*, a new society, the Boston Medical Library Association, was founded with O. W. Holmes for its first president. A librarian was appointed and some rooms engaged in which the local medical societies could hold their meetings in an atmosphere of books which some of them might be tempted to consult. Up to that time, it is said, the local profession at large read the *Boston Medical and Surgical Journal*, *Braithwaite's resumé* of English medical literature, and little else.

All this activity on the part of an enthusiastic and seemingly irrepressible young man, who proposed to fuse many select organizations into one and to pool their books, was doubtless very disturbing to his conservative elders. But their opposition was overcome; temporary quarters were secured; and the result? Before three years were out, the quarters proved inadequate, and what promised to be a permanent abode was accordingly purchased.

This happened to be the former dwelling of Dr. Samuel Gridley Howe, a man who would be better known to the profession had it not been for "The Battle Hymn of the Republic" which served to obscure the visibility of Samuel Gridley in favor of Julia Ward. But the sacred spot proved to be no "permanent abode." Ere twenty years had elapsed in rooms which could with convenience hold some 5000 volumes, over 30,000 and as many indexed pamphlets had accumulated.

So the local profession dipped again into its pockets and even more effectively into those of its obliging friends. A handsome building, to serve for all time, was erected on the outskirts of the then residential district; and what amounted to an Academy of Medicine with the library as its main feature was established.

How unimaginative and myopic we are, to be sure! The 30,000 volumes transferred to the empty stacks of this carefully planned new building in 1901 have become 145,000; nor does this include the vast number of uncounted pamphlets and theses, of portraits and engravings, of manuscripts and *epistolae obscurorum medicorum*, not to mention an extraordinary numismatic collection, and historical curios and memorabilia of untold sorts—all most precious, all well catalogued, all of the utmost value and service to the profession.

And now, after a short twenty-five years, this new building, as was its humble predecessor the one-time residence of the Howes, has become so gorged with books there is scarcely standing room for the official staff, and the Library Association finds itself again at the cross-roads—"To move or not to move."

With a different setting how familiar this story would be to every community. The discussions concerning it were not intended for my youthful ears, but I can recall the founding, in the late 1880's, of a "Society of Medical Sciences" the avowed purpose of which was to develop a medical

library worthy of Cleveland's undoubted future position as a centre of culture and education.

Though the seed be sown growth is discontinuous. The right man or the right group of men to solidify and to energize the profession are not always at hand nor are their efforts permanent. With their passing the doctors again become individualized, or separate into groups or cliques. The community library gets neglected, soon becomes antiquated, and a period of indifference follows until some new spirit, by arousing their sense of responsibility in common, ties separated groups together again.

Such a turn-over comes about once in every generation. Your Prospect Street home was a monument to the activities of those here only in spirit—Allen and Rosenwasser and Milliken and Weber and Handerson—just as this present building is a monument to their self-sacrificing successors, the energetic President and the hard-working members of a most efficient building-committee, who share the gratitude of us all.

But as books crowded you out of your recent more humble quarters so will they in time from this magnificent hall. Books will like the look of this place, will come in swarms, will drive you into additions or, like the Bodleian, under ground in fifteen years, or into another and still more palatial home in thirty or less. That at least may well be your expectation and indeed your cherished hope. Without growth a library becomes a *corps inanimé;* and growth is what that forward-looking man, Dudley P. Allen, whose honored name this beautiful building carries, would certainly expect of the library he so handsomely endowed, and which should worthily represent the Cleveland profession.

The doctors' books are of a different sort from the lawyers' and the preachers'. They in their professions depend as yet largely upon authority. The doctor, ever since Galen was toppled from his dominating seat, has been skeptical of authority and perhaps too much inclined to novelty. But if he makes any pretense of "keeping up" with the amazing, prodigious and often revolutionizing advances which, through some new discovery, occur almost overnight, he must read, or attend meetings—or better, both. And in such a dual place as this, where he may not only have easy access to the current journals but may rub elbows with his fellows and ventilate his views in the forum of the Academy, he will have the best possible chance to keep abreast of the tide of new knowledge.

Mere numbers of books, to be sure, is no measure of the usefulness and value of a professional library. Its real value depends on the completeness of its journal files and important source-books, not on text-books of ephemeral interest.

To separate the wheat from the chaff takes the knowledge and sane judgment which Charles Harding, with the moral support of that directing Chadwick of the Cleveland profession, Dr. C. A. Hamann, has shown during the past twenty-five years with all too lean an endowment. And, given a good working library rich in its books of reference, its usefulness depends on the encouragement and convenience it offers to the reader, no less than on the infectious enthusiasm and spirit of its working staff.

There was once a doctor named Richard Mead whose famous collection of some 100,000 volumes was apostrophized by Dibdin. Mead's library motto, "*Non sibi sed toti,*" which outdoes even Grolier's famous device, "*Io. Grolierii et Amicorum,*" might fittingly be adopted for the *Ex libris* of our great medical libraries. It would in any event serve to keep green the memory of Mead and of his generosity with his books. For a library must make unselfish use of its possessions even at the risk of an occasional loss. An open shelf, like an open shop, encourages the real worker who often chooses to browse for himself and should at least be put on probation. A library unexercised, and which takes no

chances in life, is susceptible to the deterioration and scleroses certain to attend a poor circulation. To be sure, with some people there is no mine and thine in the matter of books; but one must take the chance and fill in the gaps when they occur, however painful, temporarily, the loss. It's far better than not to be used at all.

The testy librarian of tradition, miserly of his treasures, near-sightedly buried in his latest acquisitions, impatient of interruption, is an extinct species. And if such persons really ever existed beyond the pages of fiction it would be charitable of us to ascribe their traits to the absent-mindedness that a most exacting task is prone to engender. You have doubtless heard how late one afternoon the college librarian started home with a friend, and finding it raining went back to get his umbrella. As he did not reappear he was sought out and found confusedly looking for the object under "U" in the library catalogue.

Few more arduous and difficult tasks confront a curator of books than that of collating and getting bound the heterogeneous medical periodicals which comprise, it is estimated, about two-thirds of the volumes in such a library as this. They vary to an incredible degree and with no seeming rhyme or reason other than the fancy of the publisher, in their form, in their make-up, in their pagination, in their dates of issuance. There are "new series" and "old series," with changes in volume-number, with changes in name, with changes in format. What was once a quarto becomes an octavo; volumes may cover irregular periods of time and have no relation to the calendar year; some use Roman numerals, some Arabic; there may be several sets of paging in the same volume; there may be separately paged supplements, serially paged advertisements and text. Journals may suddenly go out of existence with no obituary notice, or without publishing the banns they may inter-marry and reappear hyphenated, scarcely recognizable in their new alliance.

How librarians with any bibliographical conscience keep their sanity under these circumstances should be more a matter of surprise than that they should exhibit testiness when you or I, as privileged characters, walk off with an unbound issue and forget to return it. It will be a happy day for these long-suffering persons when Ostwald's *Weltformat*—the size of the *Index Medicus*—comes to be obligatory for all medical journals. "Big quartos and long heavy royal octavos were intended to be dropped (from a Pisa or Pisgah height) upon the heads of people we strongly dislike," writes a librarian who has spent much of his life assorting and shuffling and indexing unstandardized volumes which don't fit in standardized stacks.

There have been some misgivings, I am aware, as to the wisdom of placing this beautiful building so far from the beaten tracks of the practising doctor, who more than anyone else should be considered. But this is at most only a passing inconvenience, and a path to your door will soon be deeply worn by many a student and writer. Those who habitually use a library acquire that sense of attachment and obligation which impells them to bequeath to it their personal collection of books for which they wish to provide a permanent and happy home.

It was in this way that the nucleus of your historical collection came to be deposited here as the gift of that remarkable and cultured man, Dr. H. E. Handerson, your one medical historian of note—a man whose memory you will increasingly come to honor. His more-than-a-translation of Johann Hermann Baas' celebrated work held the field as the most used treatise on medical history till the appearance of Garrison's classic. Both Handerson and Baas exemplified the saying that men often do their best work in the face of, and perhaps because of, a bodily affliction. Baas stumbled upon medical history as an alluring subject wholly by accident, and humorously remarked, "In the effort to fill the immense gap in my medical educa-

tion—I fell into it." I find a letter from Dr. Handerson of April 25, 1910, in which he says:

Yes, poor Baas is dead. He was a man of unique character and of exceptional ability, handicapped for thirty years by a chronic and progressive disease of the spinal cord, which deprived him of all power of locomotion and confined him almost absolutely to his office chair.

"My correspondence with him began about 1881, when I asked his permission to translate his "Grundriss der Geschichte der Medicin," and continued without break until his death. Indeed, his wife writes me that the last letter which he was able to read was the one in which I announced my departure for the South in the effort to recover my own breaking health. No two men could be more unlike in disposition than he and I, and yet common interests and long association developed between us a friendship almost fraternal in character. I certainly feel as though, in the death of Dr. Baas, I had lost a real brother.

Yet the two had never met except through the mediation of correspondence. Could there be a better illustration of how books may serve to tie together members of our profession and bring happiness into their lives?

To inoculate a doctor with the library-habit he must be caught young and here, as I see it, you have an exceptional opportunity in being near to a growing centre of medical education. If therefore you will work for the next generation, open your stacks to the undergraduate, make him a junior member at a small fee, and let him learn where and how to find books in your reference shelves. He will in turn become your great supporter, will learn the value of books, will begin to make his own collection, which will in time come to be deposited here.

If you are to infect the young with the reading-habit, you must set the trap for them, so baited that they will walk into it unawares. Books must be made accessible. It is someone's business in every medical school to teach laboratory methods to the students but it is no one's particular business to teach them how to use medical literature, which to the majority in the long run will be infinitely more useful than an experience with smoked paper and Ludwig's drum.

Short talks on the use of the library might well be made an obligatory sectional exercise for students. Mr. Harding has given such exercises, I am aware, on methods of looking up subjects, on the use of the great indices, and so on—not always without discouragement, he relates, as when a student thus instructed requests a copy of "Ibid," saying he is sure it is just the article he needs.

But on the whole it is a wise form of self-protection for a librarian to let down the bars and permit free browsing in his pasture to those he has initiated. A few days ago on a ward visit while puzzling over a patient with ischaemic fingers and toes, I asked a student if he would get for the inspection of the class Raynaud's original thesis, and how would he go about finding it. He replied, "Ask the librarian for it." This sufficed to squelch me; but the librarian might have been otherwise engaged, and we cannot well succeed in life leaning wholly on other people.

I have always felt that a hospital or a medical school that wished to cultivate a scholarly spirit must have its library on the ground floor. A reading-habit is much less easily cultivated if a flight of steps intervenes. Some few years ago at the Harvard Medical School we had no central library worthy of the name. There were excellent departmental collections of books, to be sure, but the key was usually in the pocket of the departmental chief and the books, largely used for his selfish ends, were scarcely available to others.

We have changed all that—or have largely changed it. The most accessible room on the ground floor of our administration building had been given over in days gone by to a students' loafing- and smoking-room. Furnished with a piano

and newspapers it was much frequented. Up two flights was the students' library, comparatively-speaking unused. The reversal of these quarters was somewhat painfully accomplished, and the students now drop in to read in their spare moments and must climb stairs to smoke and gossip. It has quite unconsciously transformed their whole attitude toward Medicine.

It is futile merely to counsel the undergraduate to make use of a library, still more futile to expect him to learn the ropes of a number of different libraries in out-of-the-way places. Books must be put in his path so that he will stumble over them. This is particularly true in these days when reading as a fine art is about gone, when best sellers are sent by mail once a week for two dollars a year, when there is jazz, the movie, the radio and the flivver always at hand, with golf and bridge on Sundays: to the distraction even of his elders. No, there is only one thing to do with a young man: place both books and cigarettes in his way and caution him to beware of them as dangerous habits. He'll certainly take to one, and perhaps both.

This may after all be the right tack—to warn young people against books. Or at least against book-collecting; for one may easily become enslaved and soon so enveloped by books that they are on the floor and out in the front hall and in the dining-room till you never can find the volume you want and feel sure your wife or the children must have taken it from the place you last put it, when they borrowed your paste-pot and scissors. You long for a paddock and key like that in the old Case building. This, I take it, is just what has happened on a larger scale to the Cleveland Medical Library Association and explains this present meeting. You had become so swamped by books in your recent quarters that individual volumes could no longer be found when called for.

In fact beware of books. Some biologist has stated that if Nature could take her course unimpeded, the world would become populated with elephants wallowing about, knee-deep in a seething mass of mice. This man knew nothing of books. As a species they are imperishable, and against their multiplication, Nature has no chance whatsoever. The time will come when every tree has been felled for paper, every calf for leather, and the few long-haired and ill-nourished people left in the world will be madly making card indices of the volumes which have filled every available cranny in which they can be stored. Laws will have been passed against their importation—only a quota of the French and German and Italian and Polish—especially Polish—books to be admitted each year. For should you happen to leave a pair of foreign books alone on a shelf in the state known as their original wrappers, they breed with astounding rapidity.

Then, too, they have their diseases and are a trouble, like too many children. They have worms; they wear out their clothing, break their backs, dislocate their joints and require the constant care of a bibliotherapeutist. I may hazard the guess that if Mr. Harding were asked what were his chief needs, he would say $10,000 a year merely to put the present unbound volumes in covers and to re-bind or re-back those which are falling to pieces. Cleveland is a place of great commercial prosperity, but the emblem of prosperity is smoke, which is no less devastating to books than to the trees which once beautified the Forest City we some of us remember.

Yes, beware of books as an expensive habit and wasters of time. The habitual "listener-in" at the radio expends no more. But for books, and second-hand catalogues of their sales, I might have done better with this address concerning them. I will give you an illustration.

There was an old patriarch named Symes, who formerly kept in the Rue des Beaux Arts a musty shop solid with dusty books leaving scarce room for his occasional customer. I once on a time bought from him a volume he evidently thought I needed. Monsieur Symes loved his books

and rarely pressed them upon you. This one happened to be the Anatomy of Loys Vassaeus published in 1553 *Cum privilegio Regis.*

Vassaeus' book I did not particularly desire as it is in bad Latin which I have small patience and less ability to read. It stood on my shelves for years alongside Lipinska's *Histoire des Femmes Médecines* —a bobbed-haired production of modern times. The inevitable happened. Ere long a small and inoffensive volume was the consequence of the liaison—a mewling octavo in pale calf—the Anatomy of Loys Vassaeus in French. Aware of my responsibility, I segregated it with its mother on a back upper shelf till it could be weaned. And now comes the waste of time.

A friend has been staying with me whose metabolism and pulse rate in the presence of other people's books run high. He grows exophthalmic with hyperbiblioism. So while you endeavor to concentrate upon your proper tasks he exclaims, "Where did you get this Dolet imprint?" holding up a vaguely remembered calf of a book in his hand. "Oh, I don't remember; someone may have left it at the door, but I always thought it came into being on the bottom shelf of that case in the corner." "Are you aware," says he, ignoring my trivialities, "that Christie only knew of one other copy?" You begin to take interest. "Perhaps someone gave it to me for Christmas. But what about Dolet? Let me see the book; it's only just grown up."

And there it was, sure enough—*A Lyon. Chez Etienne Dolet. 1543. Auec priuileige pour dix ans.* And, what is more, with two other Dolet imprints, *DES TUMEURS* and Galen's *DE LA RAISON POUR EVACUATION DE SANG* newly translated from the Latin into French by the printer—a veritable triplet.

This is enough; you are lost. The attack is on. Influenza in its abruptness is nothing to it, and days elapse before you are fit to resume your legitimate job. Your fever leads you first to Richard Copley Christie's life of the unfortunate Etienne Dolet, the young Renaissance scholar and printer, contemporary and one-time friend of such as Erasmus and Rabelais, who lived in Lyons when Lyons was a place to live in, and who in the Place Maubert in Paris for his religious opinions, when only thirty-seven, suffered the fate of Servetus and was burned with his books. He had printed possibly eighty pamphlets, which are among the *rares rarissimes* of the collector. In one of them, when translating Plato's Dialogues and quoting Socrates on the immortality of the soul, he had added three words which left the meaning dubious and for this he went to the stake.

And this leaves you anxious to know about Christie, whose chapters, on Rabelais, on Padua, on the trial and the scene at the Place Maubert, give one a vivid picture of the time when printers issued books at the risk of their lives—Christie who worked eight years on his "Dolet" and hints in his preface at a long and continuing illness—but after all there is this address to write and much time has been lost. Beware the book.

Some doctors have the conception that a medical library is a place where someone can be found who will prepare a list of references with which to embellish their compositions. Some organizations even advertise that they will, for proper remuneration, look up the literature of a given subject so that writing may be made easy. Writing is not easy and cannot be made so by any known short cuts, and who ventures on such, even has he natural gifts of expression, is booked for a fall.

Writing comes after reading. One's ideas are, after all, merely those of others modified to suit one's own needs. And since reading and writing go hand in hand our medical libraries and libraries in general perhaps miss a great opportunity in not having an editorial desk presided over by a well-chosen sub-librarian to enlarge the scope of the medium of publication, which some, in imitation of the *Bodleian Quarterly Record*, have already started.

Should your own *Bulletin*, for example, come to include the Transactions of the local Academy and the papers presented before it, thus truly representing all the activities which focus on the Library, many advantages would accrue. The younger contributors could be coached in methods of presentation, and probably the salary of such a teaching-editor could be more than made up by the exchanges of foreign journals which must now be purchased and whose number increases by leaps and bounds. There are, I believe, some 1800 or more being issued. In our Boston Library only 570 of them are received, a few by gift and exchanges, but at least 400 of them are paid for at a cost of about $5000. The librarian tells me that he ought to have double this sum for periodical subscriptions alone.

In the days before there were community libraries, the individual doctor was a great buyer of books, to which the success of the early American publishing houses with their reprints of European treatises bear abundant testimony. I still have the annotated Boerhaave, the Motherby's Dictionary, the Commentaries of van Swieten, Cullen's "First Lines," Smellie's "Treatise," Beddoes' "Observations," and so on, that belonged to my great-grandfather, a hard-pressed country doctor, who rode through the winter snows of the Berkshires and died, young, from what was then called typhus, contracted, so it is recorded, while caring for British prisoners after the Battle of Bennington. Such books may become handed on if a medical line survives, but should it not, there is no place for them but the auction-room, unless there be somewhere a collection to which they may properly gravitate. It may be to a local doctors' club of sorts, to a department in a medical school, to a hospital or, in these modern times, to a community library such as this.

Look if you will at the written histories of the great medical libraries of the country, like that of the College of Physicians of Philadelphia with its 150,000 bound volumes and stack-room for twice as many, or that of the New York Academy of Medicine which is just now transferring its 140,000 volumes into a new building, and you will find that the leaders of the local profession in these as in other places have not only been users but collectors of books of which in time the local library has become the beneficiary.

But you cannot well afford to wait for these donations. The more precious classics of Medicine, the number of which is limited, grow more and more rare, more and more expensive, as the demand for them increases. New schools are being founded that appreciate the value of books. It is rumored that Tulane is buying, also Rochester, Detroit, Pittsburgh; and that the new Duke University plans to have a great library for its medical department. So even a school for undergraduates may enter into competition with you for books. At the Johns Hopkins they have drawn plans for a building with stack-room for half a million volumes and have appointed Dr. Welch, whose name spells success in whatever he undertakes, to fill yet another chair, as Professor of the History of Medicine. Such a post, for such a man, at such a place, indicates that progress in medical science is regarded as merely building on a knowledge of the past.

What is needed in every community is to bring the best possible collection of the books of reference he will need as near to the worker as circumstances permit, so as to save his time and energies. The recent tendency has been to lavish gifts on our laboratories and to neglect our libraries, but medicine needs both if we are to uphold our vaunted reputation of being a scholarly profession.

Some day when you have the endowment you deserve, you will come to enlarge your collection of the early treatises which the medical historian particularly needs. You may not aspire ever to rival the Philadelphia library in the possession of cradle-books, but those of the sixteenth century should be gathered in when

they turn up at reasonable prices, even though, to use an expression of Osler's, you may have to "bleed the Fellows" for the wherewithal.

Your library committee doubtless has seen other more immediately important gaps to fill, and has resisted the temptation to enlarge the historical collection of which the Handerson bequest makes but a small beginning. Nor did you rise to the fly of the Fabrica of Vesalius which was quietly cast on the pond by Howard A. Kelly, a very estimable sort of person in his way, though he has led many a librarian and many a helpless young student into a bibliophilic downfall. He and Osler, I believe, bought up every copy of Vesal's *magnum opus* that came on the market and baited libraries with them. This was bad enough, but what Dr. Kelly did to me, an individual, was worse.

My former colleague, W. G. MacCallum, many years ago brought back from abroad a copy of the 1543 "Fabrica" which he had been tempted to purchase, but conscious of the dangers of bibliomania he decided to present it to me, as a person presumably immune. I thought I was, having never collected anything more serious than postage-stamps and butterflies; but Dr. Kelly, hearing of it, promptly gave me a copy of the 1555 edition, in pigskin, with metal clasps, as it had come fresh from the press and bindery.

I fell. It was of course interesting to see what changes Vesal had made in the later text; and then there were other editions, posthumous ones, to be compared, and if possible possessed. Vesal had complained to the learned Oporinus, his printer, of various plagiarists of his earlier anatomical plates; these must therefore probably be of interest. And then the many other authors his copyists and imitators, and the printing-houses which issued their books; and what other medical books they printed; in turn lead you on, with a ring in your nose.

You begin to feel that you would like to know something about Vesalius the man, and about his contemporaries, and about his life other than as an anatomist. And so whenever you chance to be abroad you follow his footsteps, and look in the galleries for his portraits, spurious and otherwise, of which there are many. Then there were other books which he published, and innumerable copyists of them, in England, in Spain, in France, in Italy, and the Low Countries whence he himself came; and you soon get into the habit of second-hand book catalogues. Ere long the unconscionable people that issue them learn of your frailties and tempt you sadly, meanwhile putting up their prices to such an extent that when the post delivers at your door a brown-paper parcel with foreign stamps on it you have to prevaricate before your family and audibly wonder who could possibly have made you the present of another old anatomical work.

Like the proverbial pebble cast into the pool with its ever-widening circles, just so, one may start with a single book written by a single person from which the history of the world may seem to radiate. There are of course limits to this as to any hobby if you're not cautious, but as a form of relaxation for a tired and often harassed doctor it beats golf or bridge and all out-doors together.

Its a far cry from the few personal books in the study of the individual doctor to the great national collection under the direction of the Surgeon-General of the Army the very mention of which should bring to mind the name of John Shaw Billings. His vision and industry, more than that of any other person, and purely through the medium of books, has given the American profession the tool essential to its advancement—a classified catalogue of all medical literature. It was this monumental Index which brought into existence the great medical libraries, like your own, for without it they could hardly be utilized.

But no local library, however rich the community, can aspire to anything comparable to the vast collection in that treasure-house at Washington. If you

should wish to know how books breed books and would take due warning therefrom, place beside the existing 42 volumes of the Index Catalogue with their two million or more listed titles—place beside these heavy green-covered quartos the wee volume printed on October 23, 1865, with its 599 titles, which represents all that Dr. Billings had for a nest-egg. They were mostly the Systems and text-books of the early 19th century, the medical classics being represented merely by the publications of the New and Old Sydenham Societies. The oldest actual publication was Verheyen's Anatomy of 1717. Compare this humble start, with a library which now contains nearly 500 incunabula among its 350,000 volumes and as many unbound pamphlets.

And as this is the "last word" in medical libraries, it may properly be the last thing to mention in an address about the doctor and his special books—an address which, simmered down, says nothing more than has always been said, that books are the most important tools of our craft when assembled in mass in our great medical libraries; that books no less may be to the individual doctor his greatest source of relaxation, his greatest solace in times of trouble, when near to his hand on his own shelves.

We have come here in a spirit of thankfulness to those in and out of the profession who have given so generously of their time, so generously of their money, as to make this superb library building what it is. But it must be something more than a mere symbol. Cleveland is looked upon as one of the most prosperous and forward-looking of our greater American cities. She cannot afford to risk her reputation on her leadership in commerce and manufacture alone. She is in a position to compete for leadership in the arts and professions.

Since this Cleveland Medical Library Association, as I understand it, stands in the place of the landlord to the Academy every self-respecting Cleveland physician should be a member of both. We shall see, ere long, in this immediate vicinity one of the great medical centres of the country. It will need vision; it will need loyalty; it will need money. Where there is vision and enthusiasm the rest will follow. Your part of this task is to see that one of the great medical libraries is gathered here, abounding in works of historical and theoretical no less than in works of immediately practical value, for without this your local profession will be greatly disadvantaged. The Academy, with which you are affiliated, with prudence will come in time to be the arbiter of all matters relating to health, hygiene and sanitation, which are such vital factors in community welfare. These are great responsibilities. But the country has learned that Cleveland is a city that eagerly rises to responsibilities and that her citizens are more prone to drive the car of progress than they are to follow in its wake.

BOOK REVIEWS

Plastic Surgery of the Orbit. By J. Eastman Sheehan, M.D., F.A.C.S. Professor of Plastic Surgery, New York Post-Graduate Medical School and Hospital; Associate Surgeon and Lecturer to the International Clinic of Otorhinolaryngology and Faciomaxillary Surgery, Paris, etc. With a Preface by Pierre Sebileau, Professeur de la Faculté de Médecine de Paris. Pp. 348; illus. Macmillan Co., N. Y. 1927.

The late war brought to a high degree of excellence a new school of plastic surgeons. Until recent years plastic surgery was classed as a thing which beautified aging women and gentlemen born with unpleasant appearing noses. There are still those who flourish by courting the vain and unsuspecting; but, on the other hand, there has grown into being a type of surgeon who is doing both wonderful and much needed plastic work. It is surgery involved and calling for skill in one trained in the fundamentals of the surgical art, a field no neophyte need attempt.

Dr. Sheehan's book is therefore welcome. It is well written, printed in large type, profusely illustrated and in length 348 pages.

The first part deals with anatomy and physiology; Part 2 with preparation, after care,

skin grafts, surgical conditions; while Part 3 deals with operative procedures. In Appendix A is an article on anesthesia by I. W. Magill, M.B., B.CH., B.A.O., of Queen's University, Belfast, while in Appendix B the book closes with a consideration by the author of the evil results of paraffin injection.

Diseases of the Mouth. By Sterling V. Mead, D.D.S. Prof. Oral Surgery and Diseases of Mouth, Georgetown Dental School; Prof. Diseases of Mouth, Georgetown Medical School; Oral Surgeon to Georgetown Hospital; Dental Surgeon to Providence Hospital, etc. $10. Pp. 578; 274 illus. 29 col. pl. C. V. Mosby Co., St. Louis, 1927.

This excellent book is well worth while to both surgeon and internist, and is well written. The publisher has also done his part in making the book good to feel and look at.

Dr. Mead begins with a consideration of the Oral Examination and then covers the field of Radiograms, Diagnosis of Pulp Vitality, Transillumination of the Teeth and Gums, Bacteriologic Examination, Disorders of Enamel, Dentin and Cementum, Dentition, Abnormalities of the Teeth, Malocculsion, Saliva, Dental Calculus and Accretions upon the Teeth, Localization of Unerupted Teeth, Impacted Teeth and Foreign Bodies, Impacted and Unerupted Teeth, Periodental Diseases, Diseases of the Dental Pulp, Periapical Diseases of the Teeth, Pulpless Teeth, Specific Infectious Diseases, Infections of the Floor of the Mouth and of the Neck, Diseases of the Blood and Blood Vessels, Diseases of the Nerves, Diseases of the Lip, Diseases of the Tongue, Diseases of the Throat, of the Salivary Glands and Their Ducts, of the Maxillary Sinus, Congenital Clefts of the Lip and Palate, Stomatitis (done in a most thorough manner), Diseases and Disorders of the Mandibular Joint, Diseases and Injuries of the Maxillary Bones, Fracture, Tumors, Cysts, Temperatures, and Relationship of Oral Sepsis and Systemic Disturbances.

While many physicians will read this work with profit, it is hoped that its distribution will be a large one among dentists also.

Demonstrations of Physical Signs in Clinical Surgery. By Hamilton Bailey, F.R.C.S. (Eng.), Surgeon, Dudley Road Hospital, Birmingham; late Honorary Assistant Surgeon, Surgical Registrar and Tutor, Liverpool Royal Infirmary; Surgical Registrar and First Assistant, London Hospital; etc. $6.50. Pp. 234; 261 illus., some col. William Wood & Co., N. Y., 1927.

As a rule a reviewer of books reads only parts of the work before him. He is most interested in the table of contents, the index, and the general make-up of the volume. He may read a chapter here and there, glance and scan page after page, and so get a hazy, general idea as to whether or not the book is good, very good, bad, or just terrible. If it is very good or very terrible he delves deeper into the pages open before him. Though mediocrity simply bores—the extremes fascinate.

This work of Hamilton Bailey is of such merit generally that the reviewer read it "from cover to cover."

In the first chapter, the author begins with an outline of the seven stages necessary to a surgical diagnosis. After enumerating them he says, "The seven stages may be termed the 'surgical crescendo.' It is with the second stage [the elicitation of physical signs] and the latter part of the fourth [a differential diagnosis, through a mental process largely of exclusion, but reinforced when possible by further physical signs] that this book is entirely concerned."

It is a book recommended to every senior student in medicine. Every surgeon might well idle through its pages. It covers a familiar field in a well-rounded style and enriches one's scientific knowledge. In many ways its general style reminded us of Cabot's "Physical Diagnosis" . . . and this is praise, indeed.

Lehrbuch der Operative Geburtshilfe für Ärzte und Studierende. Von Professor Dr. Georg Winter, emer. Direktor der Universitäts-Frauenklinik in Königsberg in Pr. Unter Metwirkung von Prof. Dr. W. Benthin, Priv.-Doz. Dr. H. Naujoks. Berlin: Urban & Schwarzenberg, 1927.

Professor Winter is known to every English speaking obstetrician. It is another example of a man's reputation and fame for outdistancing the man himself.

In this splendidly printed and illustrated book of 475 pages on operative obstetrics, Professor Winter has not offered anything new, so much as correlated and presented his subject is an orderly, logical and interesting manner. Unless one reads German all this is lost. But, at that, we suggest that the teacher and

obstetrical specialist procure this volume for the illustrations, if for no other reason. The black and white and colored pictures are of a high order and cover the field of operative obstetrics. Even though one cannot read the text, he can derive no end of ideas and information from the plates.

THE "WELLCOME" PHOTOGRAPHIC EXPOSURE CALCULATOR, HANDBOOK AND DIARY, 1928. Burroughs Wellcome & Co. N. Y. 1928.

The annual appearance of this extremely interesting and useful little handbook is awaited with great anticipation by many who rely upon it year after year.

No effort has been spared by the compilers to make the 1928 issue up-to-date, popular and helpful. A brief review of its contents will reflect the scope and character of the book.

The frontispiece shows a splendid reproduction of an Alsatian Wolfhound produced by two-color toning. The toning method is explained in detail and is novel and interesting. Facing the title page is an official photograph of the Duke and Duchess of York's Royal Tour to New Zealand and Australia.

The literary contents are written as simply and directly as possible and include articles on development by all methods, desensitizing, intensifying, reducing, printing, toning, etc. In the exposure section all the plates and films, bromide and gaslight papers have been carefully tested and the speeds revised. The list has been made complete by the addition of all the new material brought upon the market up to the time of publication. An article on exposure in cinematography will be appreciated by the evergrowing number of motion-picture workers.

The book is clearly and progressively arranged so as to provide a complete guide to picture making, from the calculation of the correct exposure to finishing the print; and it includes a host of practical tables, suggestions and tips, equally indispensable to the beginner and the expert.